Light and LIGHTING

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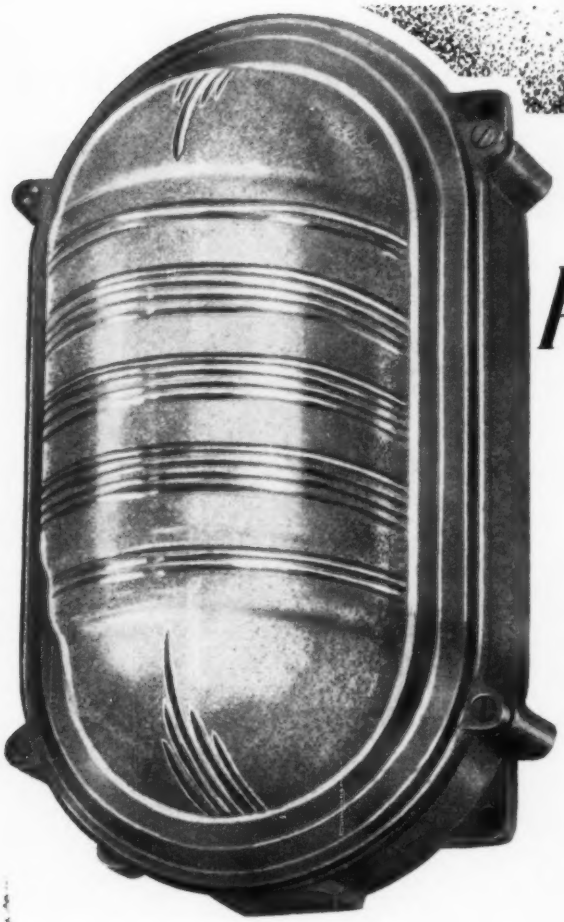

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A

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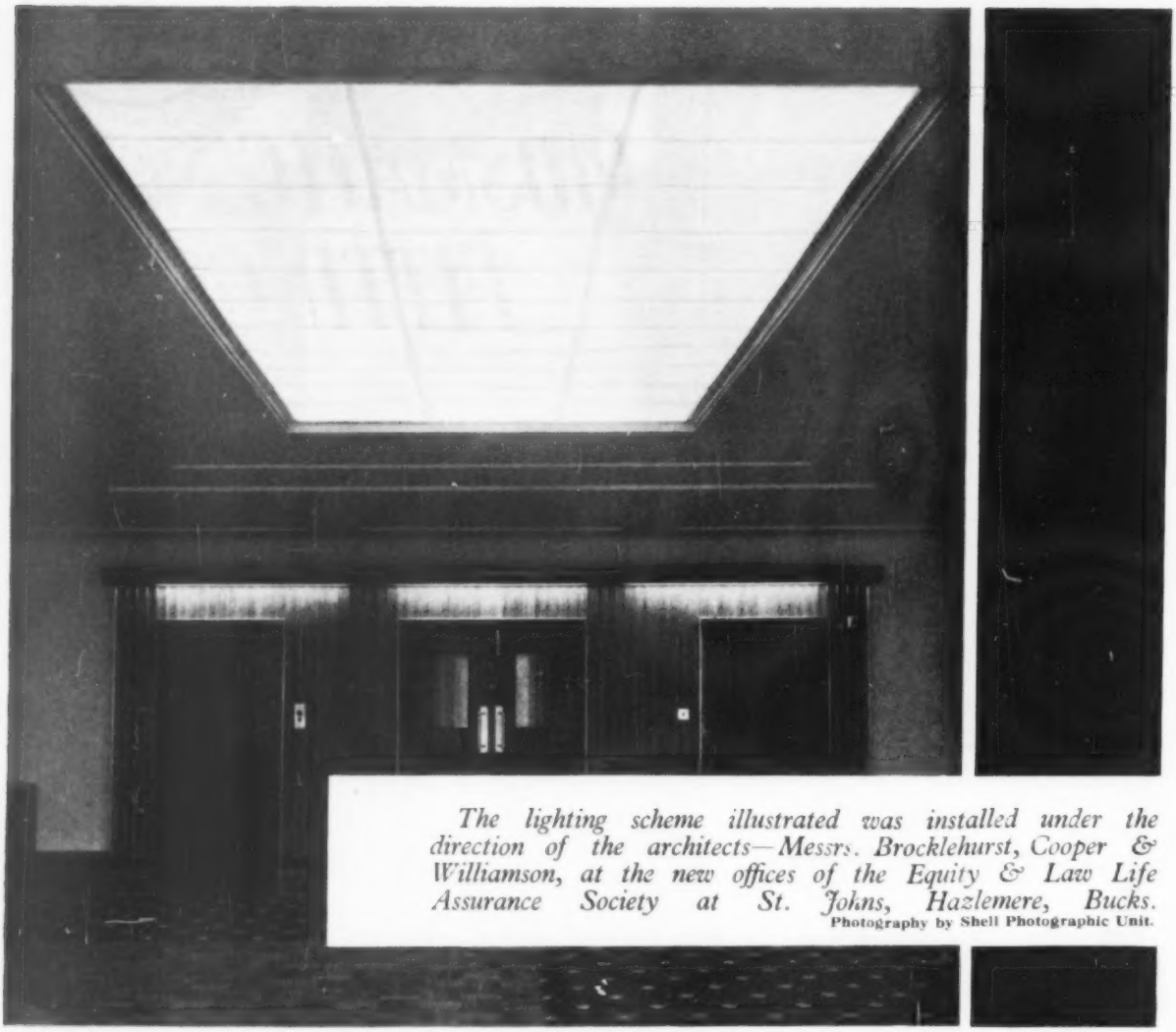

The lighting scheme illustrated was installed under the direction of the architects—Messrs. Brocklehurst, Cooper & Williamson, at the new offices of the Equity & Law Life Assurance Society at St. Johns, Hazlemere, Bucks.
Photography by Shell Photographic Unit.

· · · *for illuminated ceilings laylights and lighting fittings*

Patent Application No. 37491/56. Reg. Design Nos. 882725, 882726.

Material	:	Extruded light stabilised Anti-static treated Polystyrene.
Colour	:	Translucent Opal and Clear.
Size	:	10½″ wide centres × 4 ft. panels.
Weight	:	10 ozs. per square foot.
Light Output Ratio	:	54% to 60% Opal. 80% to 90% Clear.

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Easily removable for cleaning with damp cloth.

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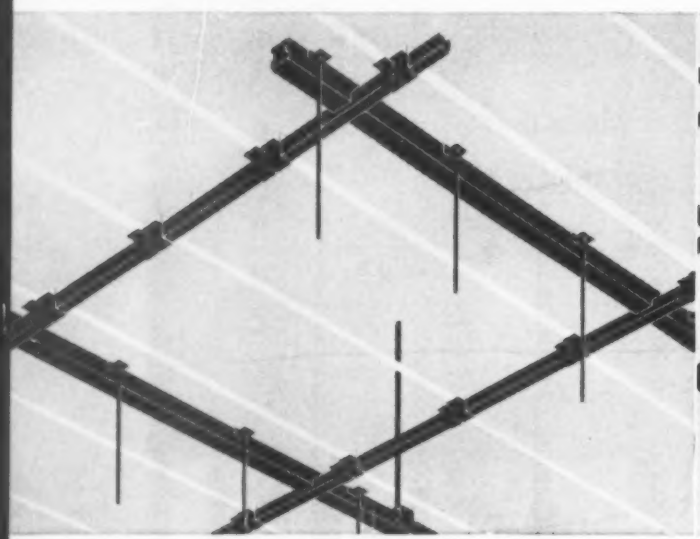
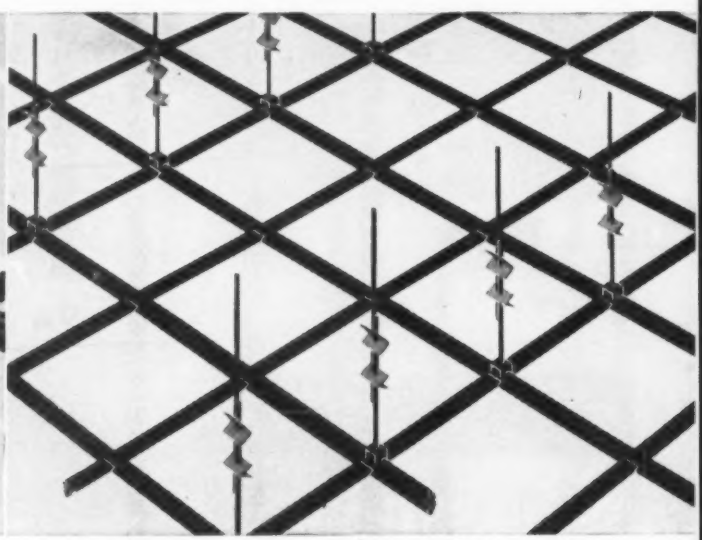
—a new wall-to-wall lighting system with unlimited design possibilities

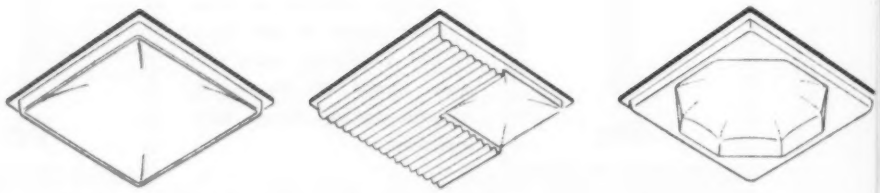
Atlas Sylvalume is a new system of ceiling lighting, using a variety of inter-changeable plastic panels and acoustic baffles on a 3 ft. modular grid. With these elements the designer is able to explore pattern, colour, texture, mood and style with complete freedom. Each lighted ceiling can be a unique creation, completely in harmony with the architectural design of the premises in which it is located: yet each effect is obtained by using a minimum number of standard components.



Trunking and unistrut assembly to support tubes and Sylvalume grid.



Appearance of Sylvalume grid from above.



Based on the Sylvalume system developed by Sylvania Electric Products, Inc., in the U.S.A.

atlas sylvalume

—quick, easy and economical to install

In the Atlas Sylvalume system the lighting equipment comprises a modified form of Atlas trunking, accommodating the control gear for the required number of Atlas 8 ft. 125 watt fluorescent tubes. The tubes are supported on cross-beams, and from the trunking is suspended an aluminium grid on a 3 ft. module. Within the grid square vinyl plastic diffusers of differing textures, colours and form can be arranged in almost limitless variety. Acoustic baffles available in different colours and finishes can be clipped to the grid. These provide effective acoustic treatment, and assist in accenting or modifying the appearance of the ceiling. The use of 8 ft. tubes and fittings ensures the utmost economy in installation and use.

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B1

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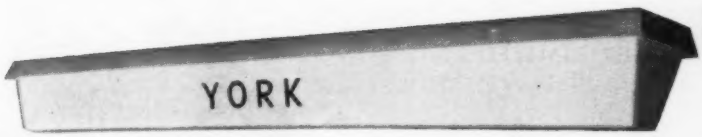

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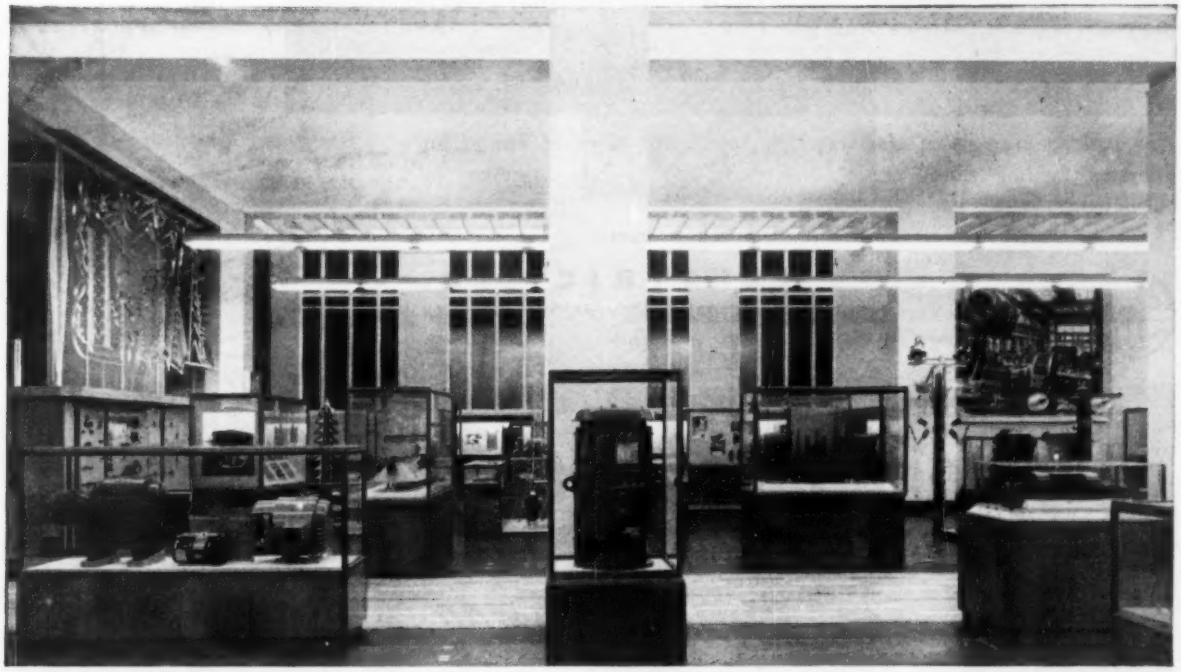
AP 15

A·E·I
Lamp and Lighting Co Ltd

Lighting flexibility in the Science Museum

Mazda fluorescent lighting in one of the exhibition galleries of the Science Museum, London.

Four rows of 'Invertrunking', each 110 feet long, carry continuous lines of batten fittings from the 'Family' range. The Mazda Fluorescent Tubes are fitted with polystyrene clip louvers butted end to end. Shallow reflectors, specially designed by the Ministry of Works, are mounted at intervals on top of the 'Invertrunking' to provide upward lighting.



'Invertrunking' enables great flexibility to be achieved in any lighting scheme. It can be suspended as in the illustration above, built into secondary ceilings or mounted flush on to existing ceilings. By using the standard components of the 'Family' range of fittings the character and intensity of the lighting can also be changed without materially interfering with the electrical installation.

Mazda *lamps stay brighter longer*

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C

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No tapped holes to find.
Slip-in or snap-on fixtures. Takes any type of lighting fitting—filament, fluorescent or discharge—at any interval.
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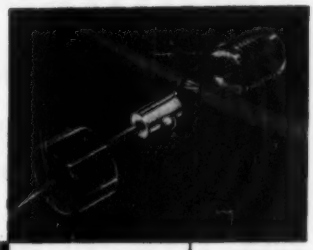
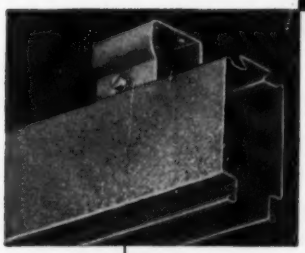
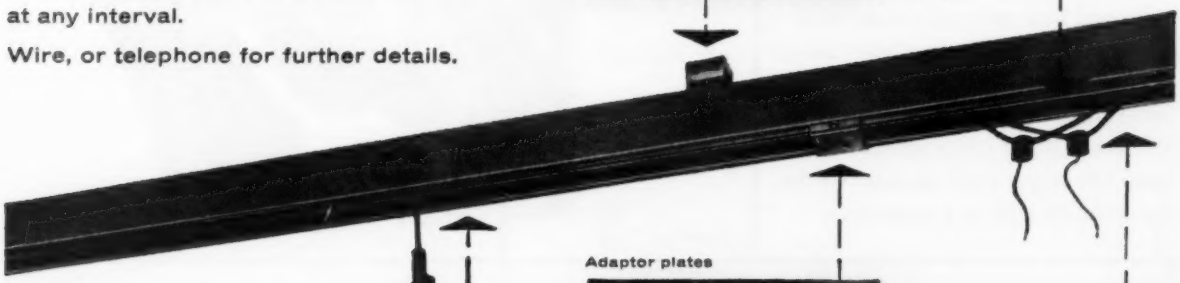


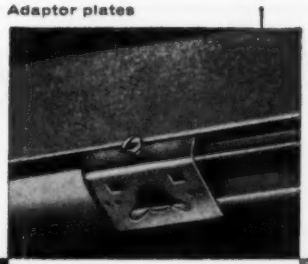
Line tap 'take-off'



Channel section and suspension stirrup



Adaptor plates



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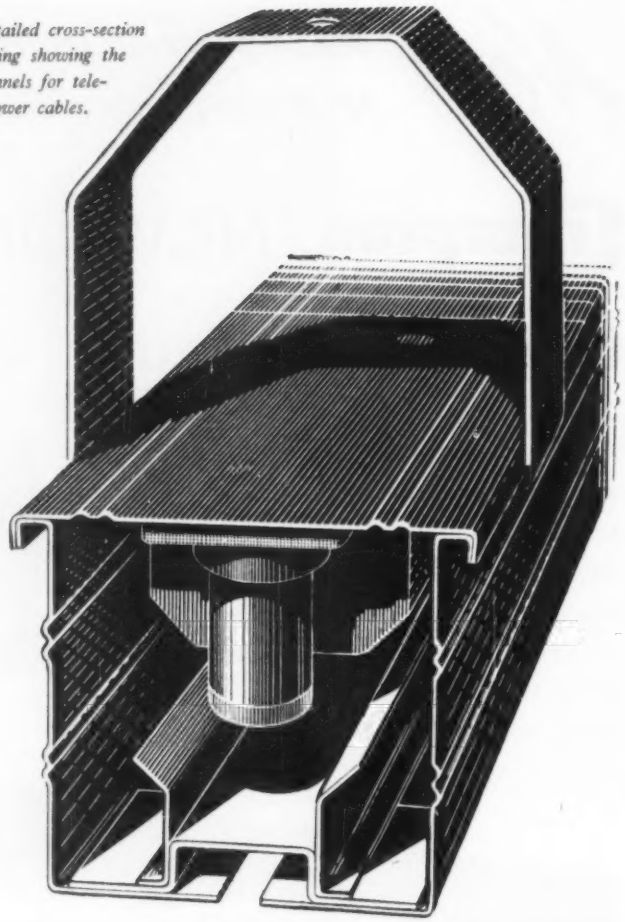
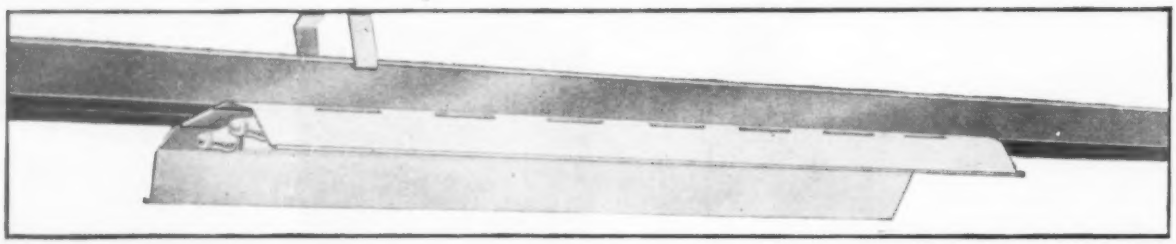
This is a detailed cross-section of the trunking showing the separate channels for telephone and power cables.





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EL52

Light and LIGHTING

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contents

Artificial Moons

AS WE go to press it is likely that the Russian Sputnik II will have made the last of its many circuits of the earth. Many people have reported seeing this man-made moon passing "slowly" in its astral orbit and having the brightness of a large star. Its life of rather more than four months is a minute fraction of the life of our planet's natural moon. Its utility as an illuminator has been quite insignificant; but it was never intended to fill such a role, and neither its inutility in this respect, nor its short yet remarkably long life is mentioned with any intention of belittling the achievement of those who succeeded in placing it in orbit. What, in fact, may come of this achievement, and of others that may be expected of like kind but surpassing magnitude, we do not know. We venture to think, however, that it is unlikely that "playing the moon" will ever become one of the primary functions for which sputniks will be designed. There have been proposals in the past for air-borne light reflectors for exterior lighting by night—to wit, captive balloons illuminated by searchlights. Pyrotechnic displays of artificial "shooting-stars" and slowly falling light sources have long been used to delight us on festive occasions. But, if only on account of the fantastic cost involved, effective artificial moons seem likely to remain mere subjects of science fiction.

Notes and News

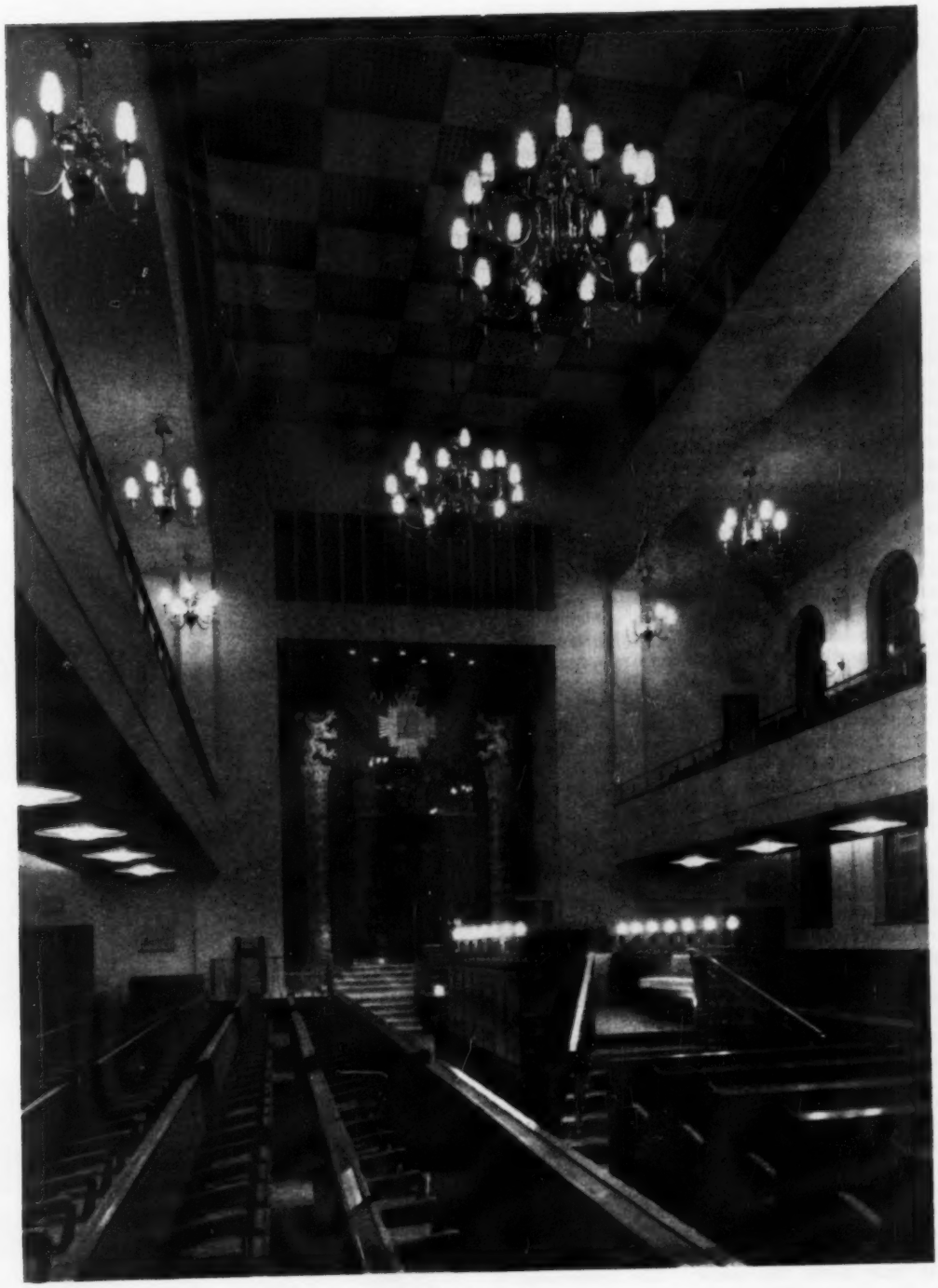
BEFORE making any comment on one or two recent IES happenings we would first remind those who have not already done so that they should lose no further time in sending in their registrations for the Summer Meeting at Eastbourne. If it is true that time appears to pass more quickly as one gets older then we must be approaching a ripe old age for the weeks seem to pass in a flash, and it seems only the other day that we received the first notice of the Summer Meeting. Our contemporaries, however, still look remarkably young and are only taking a little longer than usual to fill in their form and make out their cheque. Anyway there is still time to do something about it—provided you do it quickly. Incidentally why is it that visitors from overseas get in their registrations so much quicker on the whole than people in this country? We have often found that we get a reply to a letter to someone in Australia quicker than we do from someone in the SW1 postal district.

We really meant to start this note with a comment on the IES Conference on Industrial Lighting which was held on April 1, and on the new IES *Transactions*. A more detailed report on the former will be found elsewhere in this issue. This was a new venture for the IES but so successful was it that we hope other conferences will be arranged from time to time. The audience on April 1 consisted of some 200 works engineers and works managers, all of whom knew enough beforehand to appreciate that lighting is something worthy of their attention and thought that a day devoted to discussing it would be worth while. From the comments that were made they certainly thought it a day well spent. The conference was opened by Mr. R. Bramley-Harker, Deputy Chief Inspector of Factories, who was introduced by the President of the IES. The chair during the day was taken by Dr. W. E. Harper and talks were given by Messrs. H. Hewitt, W. R. Stevens, W. Robinson and J. G. Holmes. The EDA film "New Light on Industry" was shown. The delivery of the talks and the discussions were very good indeed. The programme was a fairly tight one but it ran dead to time throughout the day—this in no small way being due to the excellent staff work at the Northampton College of Advanced Technology, where the conference took place, which was supervised by Dr. C. A. Padgham. A very good conference indeed—good not only for those who attended but also for the IES and the lighting industry. We hope we shall see more such conferences, for which several suitable subjects come readily to mind.

It was announced some time ago by the IES that as from the beginning of this year their *Transactions* would be published quarterly in a new format; the first issue has now appeared. It certainly makes a striking contrast with the old version and is a publication much more worthy of the Society. It handles much better than the old version, the pages look more attractive and it is more readable. The cover, of course, attracts attention and provides another example of the great improvement which has taken place recently in the design of the Society's printed matter—the notices for the Summer Meeting and for the conference mentioned above together with the letter heading now used by the Society are other examples. It was high time that the archaic typefaces and layouts (no one could call them designs) were thrown out; the new styles suggest a live and progressive society—they are good advertising and it is about time the Society did something to advertise itself. Incidentally, the cover of the *Transactions* was designed by John Reid.

A Royal Audience

One of the places visited by the Queen and the Duke of Edinburgh during their recent visit to Holland was the International Building Centre in Rotterdam which includes a permanent lighting exhibit. During the course of the Royal visit Mr. L. C. Kalff, of Philips, had the honour of demonstrating and explaining the work being done by the lighting industry to improve human well-being. In the ten minutes at his disposal he described the attention that is now being given to the design of the visual field and to visual comfort. He referred to the studies being made in Europe and in Britain and to the valuable co-ordination which is achieved through the International Commission on Illumination. Mr. Kalff's audience included in addition to the Queen and the Duke of Edinburgh, Queen Juliana, Prince Bernhard and the Princesses Beatrix and Irene.



The new Central Synagogue in Great Portland Street.

Lighting at the

Electrical Engineers' Exhibition

The following is a critical review of lighting, particularly of the lighting exhibits, at the Electrical Engineers' Exhibition held at Earls Court from March 25-29. The review has been prepared by Derek Phillips, A.R.I.B.A. It gives therefore the impressions of one person of the exhibition as a whole and as such gives a better overall picture of developments within the industry than is possible by merely listing the exhibits of each manufacturer.

The seventh Electrical Engineers' Exhibition was bigger than its predecessors but from the "lighting" point of view it was not obviously better. This may have been due to the influence of other intermediate exhibitions (e.g., the Building Exhibition), which sap the resources of equipment manufacturers, or to the general financial situation. There seemed to be fewer developments which were outstandingly new, but detailing on the whole was better. On the whole equipment was displayed better than in previous years.

There were some 40 stands exhibiting lighting, and for the reporter who must first find and then visit each of these the planning and layout was of little help. It may add to the gaiety of the scene to have lighting exhibits dispersed throughout the two floors but it does not assist communication and it's hard on the feet.

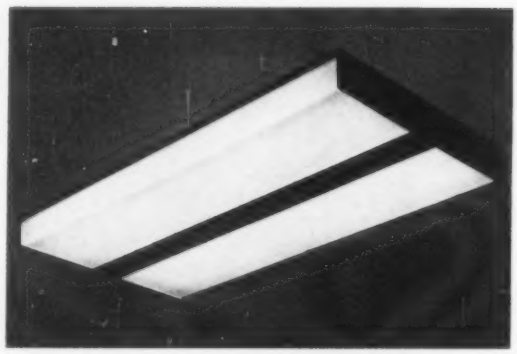
Stand design on the whole was less "gimmicky" than in past years, though part of the Courtney Pope stand was floored with cobble stones and tree trunks upon which it was impossible to walk. The Atlas Lighting stand displayed a "memory" machine for electronically checking tungsten filament lamps. This was perhaps the outstanding exhibit, thinly disguising the fact that apart from a luminous ceiling they had little new to offer.

Equipment Design

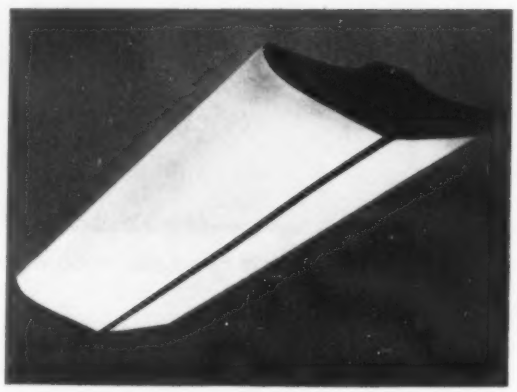
Design standards in the lighting industry are improving; from the small companies to the electrical giants there is a realisation that the time has come for a reassessment of "design" as a possible market commodity. It was interesting to see that on only one stand, that of Berry's, was there any indecision as to the advisability of showing equipment designed for to-day rather than for yesterday, and although many others obviously kept it in the cupboard against "hoped-for" reaction, faith in a revival of "Jacobean" and "Louis IV" is waining.

Mr. Penny has asked for "stars" in the lighting world, and I would like to nap a few possible designers for future reference. The designer of the excellent shop and store range for the AEI Lamp and Lighting Co., Mr. Tate, is now with Harris and Sheldon, and his influence there is already being felt. His design for a flat "module fitting" which has a total depth of 3½ ins. uses the logical solution of placing the gear down the centre. The appearance is similar to the Atlas "Domino" though more refined. "Refinement" is in fact the theme of this year's designs rather than new ideas; with the welter of new ideas in the past few years little thought has been given to refinement of detail, which has now become an urgent problem.

Many of the larger organisations hide their design staff



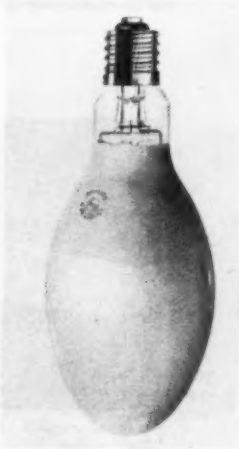
Three Harris & Sheldon (Electrical) Ltd. fittings designed by Robert Tate. Top, shallow module fitting for four 40 or 80-watt tubes with gear in centre spine; right, 'Chadwick' wall bracket; below, 'Kestrel' fitting for four 80-watt tubes.



GEC flexible suspension pendant with glass shades.

Philips 150-watt pressed glass reflector lamp; this type is known in America as the PAR lamp and is long overdue in this country.

Below left, Holophane high bay unit for use with the latest 1,000-watt MBF lamp. Right, the Philips 400-watt MBF lamp.



under the bushel of "team design," but those that are willing to publicise their designers, such as Atlas with John Reid and Hume Atkins with Peter Bell, are finding that where the architect is concerned a designer's name is a decided selling factor. David Carter's efforts on the behalf of Revo Electric have already brought a marked improvement in the appearance of their products in all fields. The "Satina" range of glassware designed for AEI by Nigel Chapman can be considered one of the best designs of the year, all the more credit since it employs glass made by an English manufacturer, Hailwood and Ackroyd.

The use of colour is a noticeable trend in this year's designs, following the fashion already set by interior decoration. Colour on fittings makes a lively display, a particular example being the new 18 colour range by Harris and Sheldon, all the colours in which are from the B.S.101 colours for building.

Many companies exhibited coloured battens for fluorescent lamps for use in the home and the range of 4-ft. battens by Vanguard were remarkable for their size, price and appearance—2½ in. by 1¾ in. batten section, 55s. white, 61s. in four primary colours (inclusive of lamp) presenting neat unselfconscious appearance. (By the oddities of the purchase tax laws, coloured battens are liable to tax which accounts for the difference in price.) Guaranteed for two years, it should assist architects and others in improving the home where it is often desirable to use simple fluorescent lighting.

Two companies have exploited the use of coloured light for display obtained by using specially finished coloured aluminium reflectors with half-silvered lamps. This device is used in the fittings by Verity's which employ their new "Alux" finish which was developed in Germany and is said to have better properties than silvered mirror, or chromium plate in maintaining high reflectance after exposure to corrosive and damp atmospheres. The same principle is used by Philips in their high intensity narrow beam adjustable spotlight fitting, the reflector of which has an anodised aluminium finish in red, yellow and blue (other coloured light being obtained by beam mixture) and uses either 24 volt 100 watt lamps or mains voltage lamps.

It was good to see evidence that the British glass industry is beginning to recover from its post-war inertia after having allowed the German glass industry to take the lead. The "Satina" range already mentioned was the result of close co-operation between the glass manufacturer and the lighting equipment manufacturer, the initiative in this case having been taken by the former. The new Troughton and Young range of decorative glassware contains some shapes produced in this country by Stevens and Williams which compare very favourably with the German glasses. The same company was involved in the development of the flexible "Harlequin" range.

The majority of decorative lighting glassware is, however, still predominantly foreign, many companies utilising the excellent design and production facilities of Peill and Putzler whilst others such as Fredk. Thomas employ craftsman-made Swedish glass with its outstanding design tradition. No major lighting company is complete without its range of pendant glassware, with flexible suspension, and it is interesting to see the contortions to which manufacturers will go to produce a "different" suspension system for spreading out the different shades; surely a simple solution is best.

Luminous Ceilings

The influence of North American design was more noticeable than in past years and was generally associated with methods of luminous and louvred ceilings.

The supremacy of the Lumenated Ceiling (exhibited by GEC, the two companies now being associated) in the field

of luminous ceilings has been challenged, generally by companies looking westwards for their inspiration. Crompton Parkinson showed their "Modulume" ceiling developed in conjunction with the Wakefield Co. of Vermilion, Ohio, and based on a 3ft. grid. To the original presentation of this ceiling acoustic baffles of a design leaving much to be desired have been added; a ceiling of this type relies on perfection of detail. The ceiling itself, however, is good and the flexibility which it offers will be useful.

A development which has travelled the Atlantic with the greatest success is the Atlas "Sylvalume" developed by Sylvania also on a 3ft. grid. The detailing is excellent, acoustic fins of most finished appearance may be added and the cost of approximately £3 18s. 0d. per sq. yard (plus 6s. per ft. run of edging) compares favourably with other similar products. The lighting equipment above the ceiling (priced separately), consists of a simple arrangement employing a main trunking unit which houses control gear, and supports "Unistrut" members carrying the wiring and lampholders for 125-watt 8ft. fluorescent lamps. The ceiling grid is of similar section to that of Lumenated Ceiling's "Lumenator Module" 2ft. grid, in that it is formed of main V-shaped sections which in turn support cross V-shaped noggins. The appearance is good due to the flashing of the whole grid which avoids the harsh dark lines of earlier ceilings employing flat H-sections.

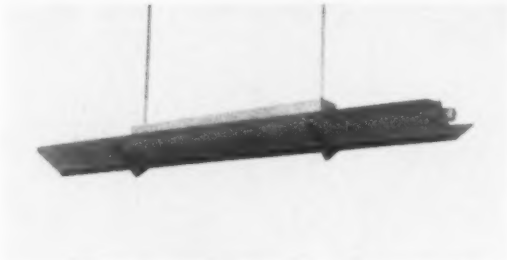
One luminous ceiling which showed no direct transatlantic influence was that of Ionlite, an associate company of Falk, Stadelmann. Based on a 2 ft. grid it suffered from poor detailing due to lack of thought in the "mechano" nature of the design. Large circular fixing plates at each joint detracted from what could be a useful addition to the ranges offered. The use of coloured "Perspex" for the display and the use of cold cathode tubing are unusual features of the design.

Harris and Sheldon showed a "small-scale" louverall ceiling called "Paragrid-tile" developed by their Canadian associates, J. A. Wilson Lighting and Display Ltd. The louvre size is ½ in. square and the suspension system neat and simple. The ceiling gives a 40 deg. cut-off in both directions, and the unique "bi-planar" construction is said to offer better lighting diffusion. It would appear to offer considerable opportunities; by placing a number of different light sources (separately switched) above the grid, a large number of different lighting effects could be obtained, a most appropriate solution in restaurant and store lighting, where light and colour could be altered at will whilst preserving a good appearance at all times.

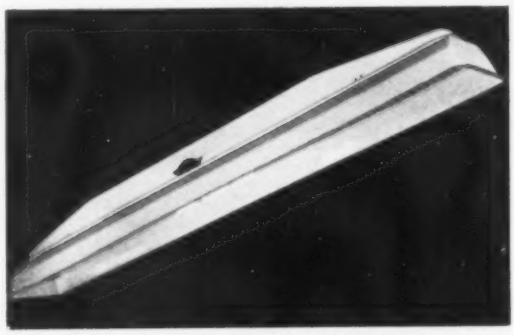
One further co-operative development should be mentioned, that of Troughton and Young with Rambusch of the U.S.A. in the manufacture under license of "downlite" fittings from 100- to 1,000-watts. These fittings are designed to give accurately controlled direct beams from high up in a building without using lenses.

Lamps

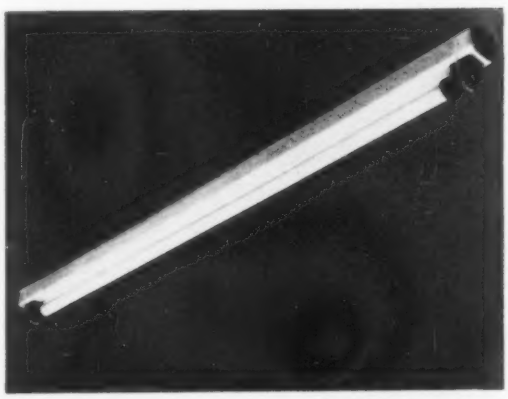
Lamp development followed last year's pattern in taking second place to lighting, only one manufacturer (Philips Electrical) giving it pride of place. Perhaps it would be unfair to say that it has been a year of small advance in this field but this is how it appeared at the exhibition. Philips showed one or two interesting features. Their new range of mercury fluorescent lamps, from 50- to 1,000-watts, in the new "bladder-shaped" isothermal envelopes, have advantages over former lamps of this type. A life of 5,000 hours is claimed, with improved colour rendering properties and higher efficiency. The average through life lumen output of the 1,000-watt lamp is 44,000 lumens. Holophane Ltd. displayed a high-bay fitting designed specially for the 1,000-watt MBF/U lamp. In order to reduce the contrast between



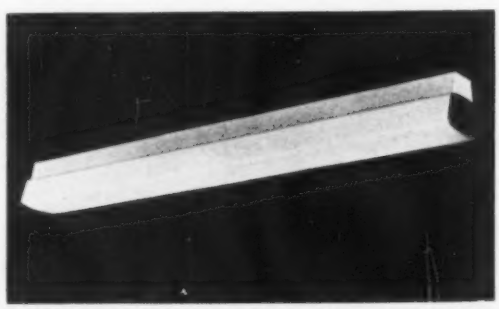
Herman Smith Smithlite Ltd. centre contact twin lamp fitting.



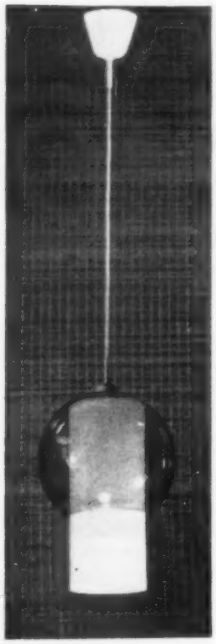
F. W. Thorpe's corrosion-proof fibreglass reflector.

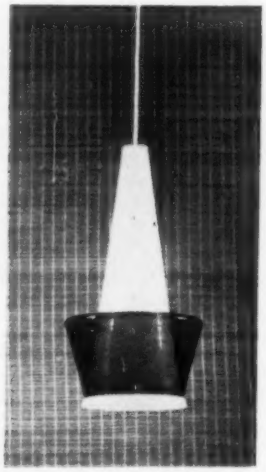


Simplex anti-corrosion fluorescent (ACF) fitting without reflector.



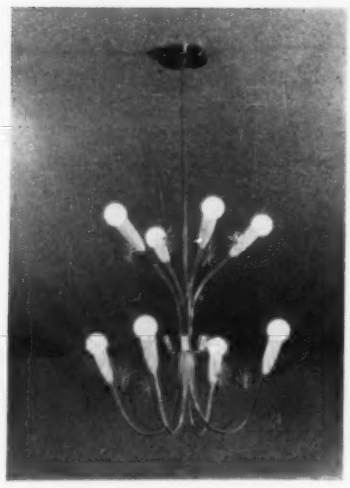
Enclosed reeded 'Perspex' diffuser fitting in the GEC '101' range.





Two fittings of Swedish glass by Fredk. Thomas & Co. Ltd.

Plant lighting fitting by Oswald Holman.



An example of the GEC small-lamp series decorative fittings.

the lamp and its background the reflector is semi-translucent allowing a proportion of upward light. These MBF/U lamps should have a special application in industrial and street lighting, where their colour rendering is sufficiently acceptable; lamps of this type have already been employed for street lighting in Germany where lanterns of very delicate profile have been designed for them.

Philips showed also a display of "dipless" headlamps. This is arranged by "lensed" lamps having a major beam to the left of the road, with a shortened beam to face the oncoming traffic. It is understood that such lamps will not be available in this country yet awhile.

The introduction of the pressed glass reflector lamps, widely known in North America as the PAR lamp, will be of particular interest to those concerned with exterior lighting. Philips showed an adjustable waterproof fitting using such a lamp; it is to be hoped that they will become generally available soon.

The "centre-contact" fluorescent lamp developed by Herman Smith although not new deserves mention in that it enables fluorescent fittings of notable light appearance to be designed. The fitting illustrated is a twin lamp version selling for £13 18s. 2d. complete with gear.

Fittings

If there was any theme for this year's lighting exhibits it was almost certainly that of "proof" fittings . . . fittings which are proof against this, that or the other. Nearly every major lighting company exhibited fittings of this kind. Some confusion is caused, however, by the lack of uniformity in the terminology used. One encountered all types of claim . . . submersible, vapour-proof, weather-proof, water-shed, immersible, anti-corrosive, splash-proof, water-tight, washable, non-corrodible, moisture-proof, acid-proof, dust-proof, dust-tight; such shades of meaning are, one imagines, open to a variety of interpretations. The one word "submersible" was used to describe not only a small newly developed 8-watt fluorescent handlamp by British Central Electrical Co. but also a massively constructed "graving dock" fitting by AEI lamp and Lighting capable of withstanding 30 lb. pressure at depths of 60 ft. and having cast bronze parts against sea water corrosion. The new BS on waterproof equipment will assist in clearing the air, and standards of dust- and acid-proofing are obviously needed.

Three fittings are typical of development in this field. F. W. Thorpe's corrosion-proof reflector fitting is moulded in fibreglass with control gear in a separate sealed compartment. The fitting is suitable for all indoor conditions (exclusive of hazardous areas) and is of particular interest to the chemical industry. The Simplex ACF fitting consists of a metal batten protected by a tube of p.v.c. which is shrunk onto the metal to form a skin-tight fit. The control gear is sealed inside the batten and all openings are then filled with rubber gaskets. It is not possible for the gear to be maintained but Simplex guarantee to replace the unit if it fails within two years. An excellent "waterfall" display showed the waterproof qualities of the unit, the appearance of which is good. P.v.c. and Perspex reflectors are available. Revo Electric showed a fitting for lighting road signs designed to meet the new Ministry of Transport regulations on weather-proofing.

A tendency to lighten the appearance and weight of tungsten flameproof fittings was apparent, and several companies showed flameproof and weatherproof fittings in which the original "water-catching" projections have been smoothed out, as in the Group IIIb fitting by Verity's in 100-, 200- and 300-watt sizes. Revo Electric showed a portable 60-watt flameproof handlamp; redesigned by David Carter, the appearance of the fitting is most satisfactory

showing that even in the flameproof field fittings can look good as well as be good. Can we expect design improvements in the appearance of fluorescent flameproof fittings?

Nearly all manufacturers have systems of trunking, varying from the complex "bus-bar" trunking of Crosslands to the more simple types designed purely to offer support for lighting units and to carry cable between them. Many of these sections are immensely strong in themselves and it is possible that in future there may be a move to use them in a structural manner in the building fabric.

Two new ranges of commercial fluorescent fittings were exhibited, both of which leant heavily on previous development. The G.E.C. 101 Range employs the new bi-pin holder for the 5-ft. lamp and offers a cleaner appearance than earlier batten fittings. The flexibility offered is considerable but no attempt is made to make the units extensible either in line or side by side. The second range is by Falks, and is not yet available. Designed by R. F. Steward, it employs a channel of stove enamelled zinc-coated steel and also uses bi-pin holders for the 5-ft. fluorescent lamp. The channel section is slotted to enable universal fixing centres, and a number of different diffusers are to be made available. It is debatable whether the individual styled diffuser can withstand the pressure of higher levels of illumination which necessitate greater numbers. The Atlas "Atlantic" range which offers extension in length and side by side, together with the new Harris and Sheldon "Luveline" extensible in length, offers a much higher degree of flexibility in a field where it is necessary that "styling" should be of an anonymous character.

A large number of decorative fittings were displayed, by many different companies, to be used for a variety of purposes. Two newcomers to the exhibition should be noted: Fredk. Thomas who displayed their Swedish glass fittings the original shapes of which will be well known to designers, and Oswald Hollman who displayed a more popular selection of "contemporary" fittings of which their "plant unit" is typical.

The prize for the most exotic fitting in the exhibition must go to a ceiling "shower" pendant by Homeshade Co. Ltd. costing £150. All in gold, it resembled a firework dropping out of the sky, and employs 60 50mm round lamps.

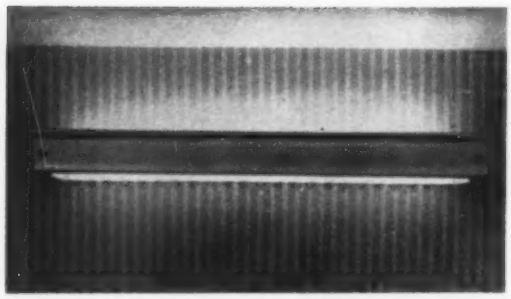
GEC's "Small-lamp-series" of contemporary fittings is remarkable for its similarity to Victorian design in some of its forms where "decoration" may be applied at every conceivable point; in the fitting illustrated, which was shown with coloured shields on the uppermost lamps, it resembled the lighting fittings in the Cecil Beaton Edwardian Bedroom at the Ideal Home Exhibition this year.

The Ekco cornice fitting will be a useful addition to home lighting, and it should find many uses . . . it is unfortunate that the designer should have seen fit to dress up the tips of the supporting nuts as rosettes; this should not deter many people, but it could be changed!

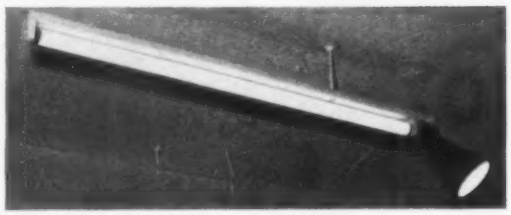
A new kitchen fitting by H. W. Field is interesting since it follows the pattern established by Atlas Lighting, the difference being that the Field fitting uses the tungsten filament ballast lamp in an adjustable reflector spot, from which it derives its name of "Spot-on." The usefulness of a "spotlight" in the kitchen is doubtful but nevertheless there should be quite a future for this fitting at its inclusive price of £4 6s. 0d.

The design of domestic exterior fittings has been notably poor—the traditional hanging lantern dies hard. SLR Electric displayed a small outdoor wall bracket which should be useful: its clean simple appearance could perhaps be improved by the elimination of the "topnot" but it is a step in the right direction.

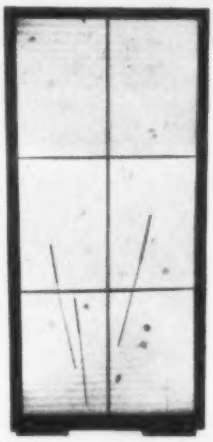
Two useful developments were shown among others on the Courtney Pope stand. The "Mobilyter," which consists of a spring-loaded metal tube to which adjustable conical



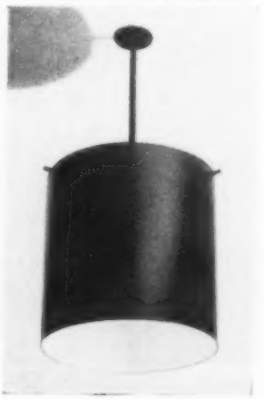
Ekco-Ensign fluorescent cornice fitting.



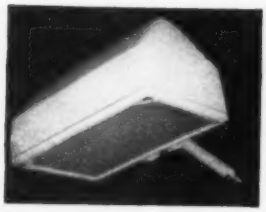
H. W. Field 'Spot-on' kitchen fitting.



Two Courtney, Pope (Electrical) introductions; above, portable internally lit screen; right, 'Mobilyter' spring loaded adjustable unit for window display lighting.



Hospital ward fitting developed by the Nuffield Hospital Research team and made by Fredk. Thomas.



Above, Revo unit for lighting of road traffic signs.

Right, SLR Electric lantern for exterior domestic lighting.

shades are attached, is designed to fit up against ceilings of height between 7 ft. 10 in. and 8 ft. 9 in. and can be moved by simply pressing down and moving sideways.

The second item was an illuminated portable screen lit internally by two fluorescent lamps. The gear is placed on the stand supporting the screen in order that the "glazing bars" may be kept as thin as possible. This screen was inspired by the tissue paper screens of Japan and the illusion is well maintained by the use of translucent panels of vacuum formed plastic into which any kind of decorative treatment may be placed.

Hospital Display

The Exhibition Committee may be congratulated in choosing an exhibit of electrical equipment and lighting applied to a specific programme—the hospital. (Is this an indication that each year will bring a spotlight upon a particular aspect of application?) A great many different lighting companies were represented, and it was interesting to see the operating theatre lighting unit of Kelvin & Hughes delivering a light intensity of 1,800 lm/ft² at a distance of 42 in. over the small area of the surgeon's operation with a consumption of only 220 watts (five 44-watt tungsten filament pre-focus lamps). The unit is so balanced as to move at the finger tips. One of the simple hospital fittings developed by the Nuffield Trust research team for hospital design and made by Fredk. Thomas was used.

Other subjects which lend themselves to this special treatment are schools, homes, and ships. It might be interesting to ask a panel of advisors, chosen in relation to the particular subject, to choose the fittings for display in order to stimulate an element of competition in their selection and for it to be something of an honour for the equipment to be on display.

Velsen Road Tunnel, Holland

To relieve traffic congestion in the area of Velsen, near Ijmuiden, in Holland, and to speed up the movement of road traffic across the North Sea Canal, a road tunnel has been constructed under the canal at Velsen where the main traffic route No. 6 from Amsterdam to Ijmuiden intersects the traffic route No. 9 from Haarlem to Alkmaar. The tunnel was opened for traffic at the end of September. Before the tunnel was built traffic on route 9 had to cross the North Sea Canal by means of ferries. In addition to the road tunnels there is also a railway tunnel containing two tracks.

All the tunnels are of reinforced concrete construction, the road tunnels being rectangular in section (Fig. 1) each accommodating two lanes of vehicles. The dimensions of this concrete section are 160 ft. wide and 24 ft. high. Each road tunnel is 31 ft. wide and 14 ft. high; the actual roadway is approximately 23 ft. wide, there being a walk-way on each side of the roadway about 3 ft. wide which is used for traffic control and maintenance purposes.

The interior design of the road tunnels can be seen from Figs. 2 and 9. The side walls have a slight slope outwards from the roadway, but slope back sharply towards the ceiling near the top. The lighting units in each tunnel are recessed in the ceiling, there being two rows spaced 14 ft. 9 in. apart; the lighting fittings, which

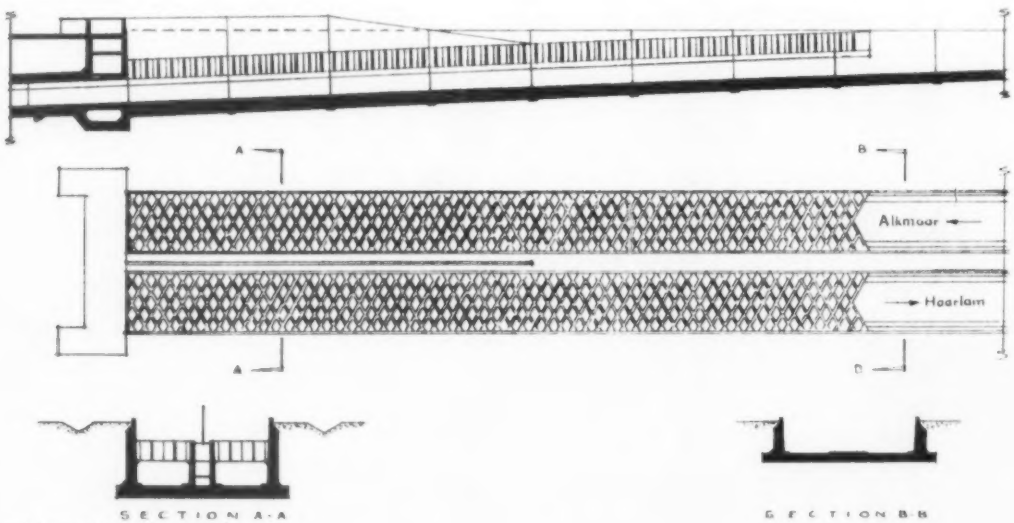


Fig. 1. Elevation and plan of tunnel approach

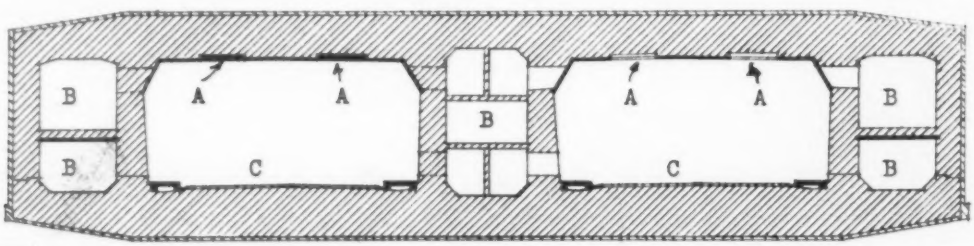


Fig. 2. Section of tunnel

Fig. 3. One of the approach roads by day.

Fig. 4. An approach road by night.

house two 4-ft. 40-watt fluorescent lamps, are aligned in the direction of the traffic so that no light source is visible to drivers. The ceiling of the tunnel is painted "midnight blue"; the walls are a very light green, having a high reflection factor, and the roadway is finished in light grey concrete. This unusual combination of design and decoration gives the impression of greater ceiling height and at the same time improves the lighting effect.

The average level of illumination in the tunnel is approximately 10 lm/ft^2. This is increased at the entrances by providing at each end of the tunnel 36 extra two-lamp fittings spaced 7 ft. 4½ in. apart for use during daylight hours.

To help drivers entering the tunnel by day to become adapted to the lower brightness within the tunnel, a system of concrete louvres 30 ft. wide and 12 ft. deep has been constructed at the portals. At the northern entrance concrete louvres extend for 425 ft., the louvres being painted black (see Fig. 8). At the southern entrance, because of the different aspect, louvres extend for 600 ft.; they are painted black only for a distance of 60 ft. from the portal, partially painted black for the next 60 ft., left in natural concrete colour for the next 35 ft. and thereafter painted white.

During the hours of darkness, the roadway under the louvres is illuminated by one 4-ft. 40-watt fluorescent lamp

Fig. 5. Close-up of the specially designed slim type lantern and column.

Fig. 6. One of the ramps at night.

Fig. 7. Showing the concrete louvres over the approach to one of the entrances.

Fig. 8. Black painted concrete louvres at the northern entrance.

fitting in a similar way to that of the tunnel, both being at a reduced level, i.e., at about a quarter of the illumination in the tunnel during hours of daylight. The ceiling of the road tunnels has been acoustically treated to reduce the noise level.

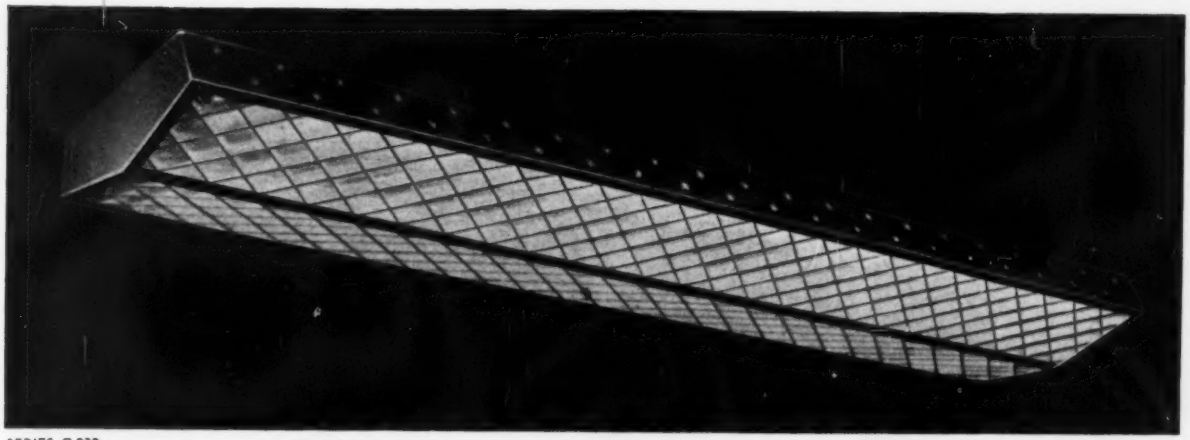
The concrete road ramps approaching the entrance of the tunnel are lit by cut-off enclosed reflector fittings each housing three 4-ft. 40-watt fluorescent lamps at a height of 29 ft. and spaced at 65 ft. apart (Fig. 6).

The tunnels themselves are 2,500 ft. long and the approach ramps and louvred section add a further 1,440 ft. at each end, making a total length of approximately 5,400 ft.

There is an elaborate approach road system linking up the two main traffic routes; the lighting for the approach roads is by means of 85-watt sodium lamps mounted in pairs end to end in specially designed slim type cut-off reflector lanterns (Figs. 3, 4, and 5) mounted 29 ft. above the road and spaced approximately 100/110 ft. apart.

The lighting scheme was designed by the Philips Lighting Service Bureau, Eindhoven, Holland.

Fig. 9. The interior of a road tunnel.



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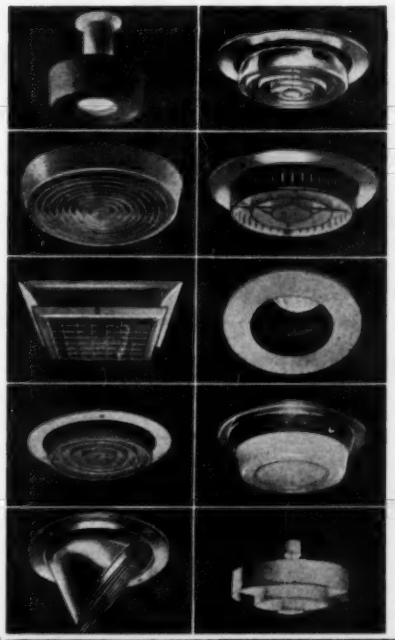

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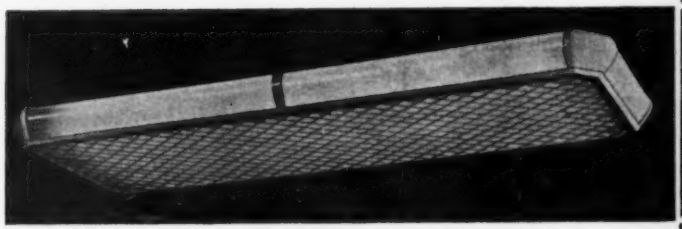

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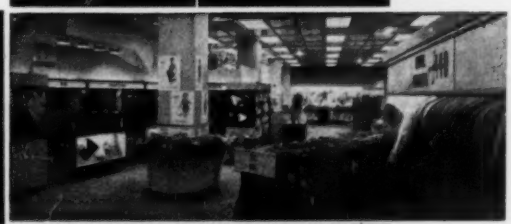

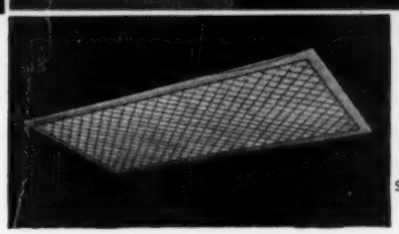

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Queen Elizabeth Building, Toronto

Architects, Page and Steele; electrical consultant, F. C. Mayberry. (President of the Canadian National Exhibition, Fred T. Walsh; General Manager, Hiram E. McCallum.)

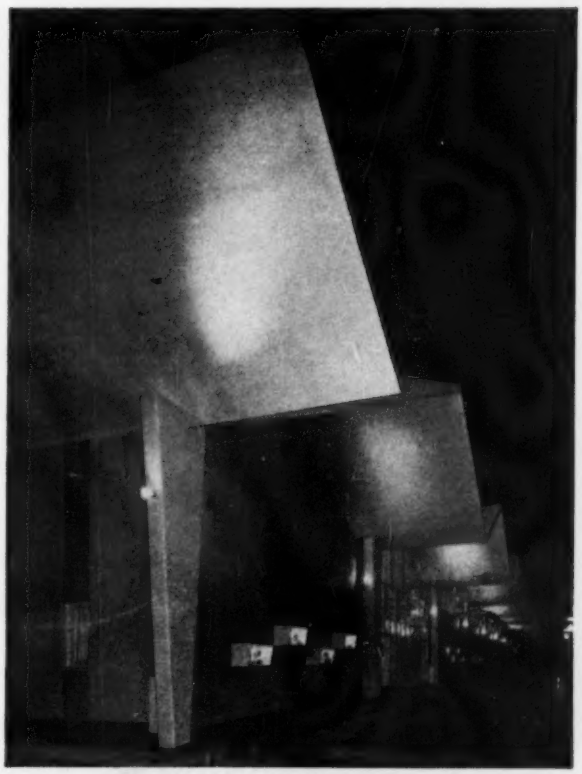
THE Queen Elizabeth Building is the latest addition to the Canadian National Exhibition in Toronto. Opened last August and designed for use all the year round, it comprises three sections : an exhibition hall providing 63,000 sq. ft. of exhibition space; executive offices and a theatre seating 1,325 people.

Externally, the building is faced with brickwork, exposed structural concrete and precast concrete slabs; the windows are metal framed; and there is a large mural placed centrally on the main part of the east elevation.

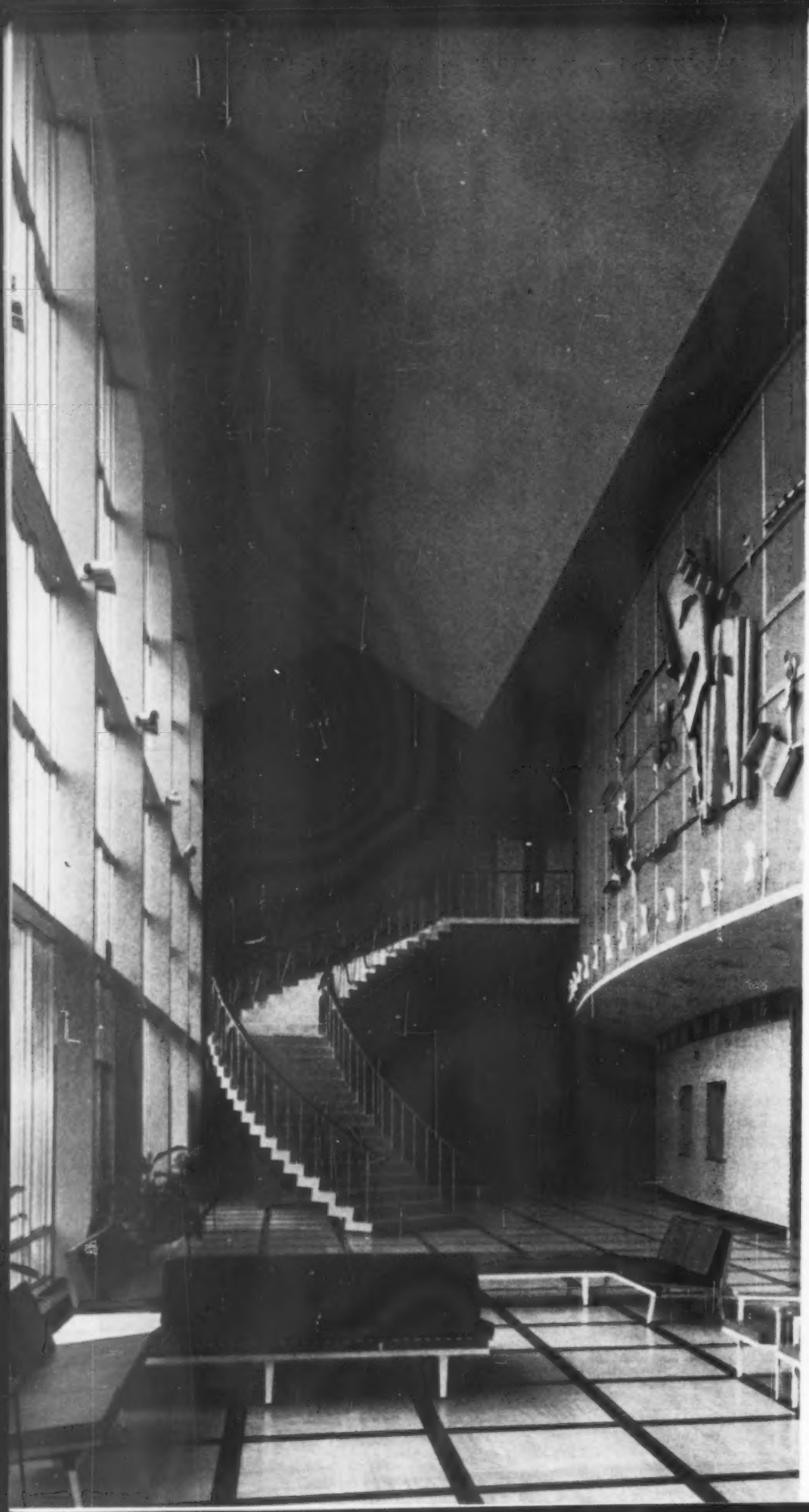
The exhibition hall is 264 ft. long and 239 ft. wide. There are only 14 internal columns, which in addition to supporting the roof house the various services—gas, electricity, water, etc.; the floor is of hardened concrete, drained to sumps; and there is a forced-air heating system. The ceiling of painted concrete gives a minimum clear height of 16 ft. and at one end of the hall there is a stage for demonstrations with an area of 640 sq. ft.

The office section, which is completely air-conditioned, comprises 14,500 sq. ft. of general office space, a bank, the directors' lounge and dining-room, a staff dining-room and the kitchens. The directors' dining-room seats 325 people and the lounge a further 175. Offices have plastered walls; the acoustic-tile ceilings are suspended 10 ft. above floor level; and the floors are of vinyl-asbestos tiles. Divisions between offices are of metal-framed, part-glazed demountable partitioning. Finishes in the directors' lounge and dining-room, which are at first-floor level and reached via a lift, are similar, except that the floor is of "Granwood" blocks.

The theatre, which is also air-conditioned, is equipped with tip-up seating upholstered with foam rubber. It has complete stage facilities, including a double turntable, a grid floor, an elevator and a counterweight system for scenery. Ancillary accommodation includes dressing



Top, exterior of the theatre wing. Above, exterior of the exhibition hall; like the canopy of the theatre entrance, the underside of the overhang is floodlit.



Left, foyer of theatre. The external wall is fully glazed, while artificial lighting comes from three sources: (i) from diabolo-shaped wall-lights on the wall facing the windows; (ii) from fittings recessed into the soffit of this wall; and (iii) from pairs of spotlights fixed to the framing of the window wall. Note the 'folded slab' roof. Opposite page, top: Directors' dining room and lounge, lit by three rows of low-brightness tungsten fittings recessed into the ceiling. Centre: general offices, lit by ceiling-mounted fluorescent fittings with 2 ft. x 4 ft. acrylic-plastic diffusers. The illumination level is 50 lm/ft^2. Bottom: general view of the building showing, from left to right, executive offices, theatre and exhibition hall. (Photographs, Max Fleet, Toronto.)

rooms, rehearsal rooms and a spotlight booth above the ceiling. Walls are of fair-faced brickwork, with sounding boards of "Transite"; the ceiling is of plaster; and the concrete floor is covered in the aisles with carpet.

The foyer is dominated by a metallic sculpture mural on the curved rear wall of the theatre, above the cloakrooms. The glass wall of the entrance façade is framed in aluminium alloy; the side walls are of exposed brickwork; and the floor is of travertine and black marble.

The exhibition hall is lit by continuous rows of simple fluorescent fittings suspended 18 ft. above floor level. The illumination level is 30 lm/ft^2, and distribution is from 100-amp., 3-phase, 4-wire distribution panels on the columns. Underfloor ducts provide facilities for extra lighting on the stands; the general lighting is remote controlled; and there is emergency lighting at the entrances, with over-riding relays giving instantaneous change-over if a power failure occurs.

Offices are lit by ceiling-mounted fluorescent fittings with 2-ft. x 4-ft. acrylic-plastic diffusers. The illumination level is 50 lm/ft^2. The same intensity is achieved in the private offices, where similar but smaller fittings have 1-ft. x 4-ft. covers. The general manager's office has a luminous ceiling of acrylic-plastic sheeting, with the lighting intensity variable from zero to 75 lm/ft^2.

The bank is lit by fittings similar to those used in the private offices, the illumination level being 75 lm/ft^2, while the directors' dining-room and lounge are lit by low-brightness tungsten fittings recessed into the ceiling.

The theatre is lit by fluorescent lamps concealed in the coves and by "pin-point" fittings recessed into the ceiling. Complete stage-lighting equipment includes five borders, a lighting bridge with spots, portable footlights, high-intensity arcs in the projection room and a gallery with 24 spotlights. There is a remote-controlled magnetic-amplifier dimmer, and the main curtains, the side curtains and the soffit of the proscenium arch are lit in three colours. There is a complete sound-reproduction system; a buzzer system for the stage; provision for television transmissions; and emergency lighting in the ceiling and the aisles.

The foyer is lit by a row of diabolo-shaped tungsten fittings fixed to the curved wall over the cloakrooms; by other tungsten fittings recessed into the soffit of this wall (above the entrances to the auditorium); and by spotlights directed at the sculpture mural.

LIGHTING INSTALLATIONS

Probably no class of building was, until recently, as badly lit as the public house. At its best, it was lit by "olde worlde" fittings and imitation candles; at its worst, by an insufficient number of fittings of a type no longer considered suitable even for commercial premises. It is only within the last few years that brewers have begun to realise that good lighting can play a big part in attracting custom to their premises and in creating a pleasant atmosphere within. Although, as yet, we have found few examples of lighting in public houses that is thoroughly integrated with the architectural design, there is evidence in many new premises of intelligent and sympathetic design or selection of fittings—both "functional" and decorative.

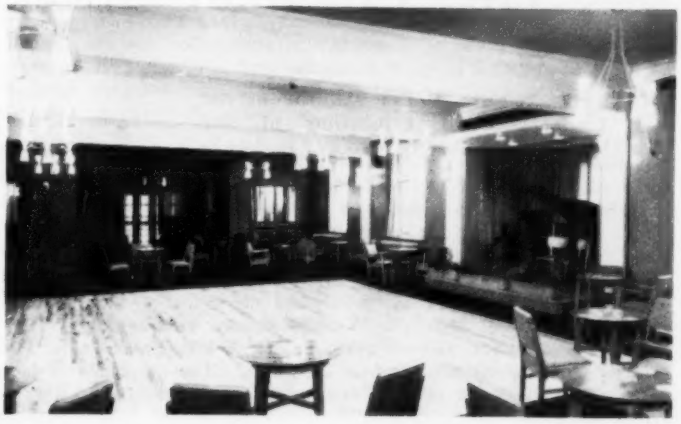
The 'Grennel Mower,' near Sheffield

This new house, the property of Joshua Tetley & Son Ltd., is constructed in rustic brickwork, with reconstructed-stone window surrounds, a natural-stone chimney, hardwood weather-boarding to the entrances and a roof of dark-brown pantiles. Public rooms are finished in natural hardwoods, with walls and ceilings decorated in pastel shades. Interest is added by framed prints, and by colourful fabrics and carpets. The lounge bar (*right*) is lit by two 5-light pendant fittings and five 2-light wall brackets. The bar counter is lit by fluorescent lamps concealed by the canopy and by four eye-ball spotlights recessed into the canopy. The display fitting behind the bar is lit by fluorescent lamps concealed by the decorated glass panel and by two spotlights fixed to the rear of the bar canopy. (Architect, J. Foster, L.R.I.B.A.; lighting fittings, Falk, Stadelmann & Co. Ltd., Fredk. Thomas & Co. Ltd., G.E.C. Ltd.)

The 'Ship,' London, E.C.

This new public house at Finsbury Pavement replaces premises of the same name almost completely destroyed during the war. Both externally and internally the design has been based on nautical motifs. There is, on the ground floor, a mahogany bow window flanked by authentic ships' masthead lights, while in the saloon bar (*left*) the wall facing the counter is decorated with signal flags. The architects (Kenneth Lindy, Joseph Hill and Partners) have, however, avoided the introduction of ships' gear and have preferred to provide the nautical atmosphere in more subtle ways. Thus, the counter front is of sea-green mosaic, banquette seating is upholstered in navy blue, with white piping, and the pendant lighting fittings, of copper and glass, are designed to resemble ships' lanterns. Concealed fluorescent lamps light the behind-the-counter displays and the photomural of The Pool of London. (Lighting fittings, Falk, Stadelmann and Co. Ltd. and Troughton and Young Ltd.)

PUBLIC HOUSES



The 'Sparrow Hawk,' Edgware

The interior of this new Whitbreads house was designed by Richard Lonsdale-Hands. The saloon bar (*left*) is large and L-shaped. It is half-panelled throughout in West African walnut, with a contrasting ebonised skirting. The upper part of the walls and the ceiling are papered; the fireplace surround is of black tiles; and the floor is of alternate squares of amber and terra-cotta linoleum tiles. Lighting is by three-light pendant fittings, with gold-anodised frames and opal-glass shades, and by semi-recessed down-lights over the counter area. Seen above is the Warren Hall. This room can provide seating at tables for 150 people. The dance floor is of Canadian maple and the lighting is by four-light pendant fittings comprising diabolo-shaped shades mounted on a brass hoop and suspended by a lighting cord. (Lighting fittings, Courtney, Pope (Electrical) Ltd.; G.E.C. Ltd.; Merchant Adventurers Ltd.; Troughton and Young Ltd.)

The 'White Knight,' Crawley

Designed for the Improved Public House Co. Ltd. by E. B. Musman, F.R.I.B.A., this pub is unusual in that the saloon and taproom have large clear-glass windows, looking on to a paved terrace. Another innovation is the unlicensed coffee room (*below*), which is linked to the main building by a pergola. Seen on the right is the Knights Saloon, which is lit by composite fittings made up from standard parts, the suspension being from Troughton and Young's "Harlequin" range and the reflectors from their "Mondolite" range. Lighting over the bar is by semi-recessed fittings, while the coffee room is lit by ceiling-mounted units. Note the adjustable spotlight for lighting food displays.

The Physical Society Exhibition

A report on the exhibits at the forty-second exhibition of the Physical Society held in London in March.

During the last week in March the two halls of the Royal Horticultural Society in Vincent Square were again thronged with visitors to the Physical Society's 42nd Exhibition of scientific instruments and apparatus. The number of exhibitors was the same as last year but the items of direct interest to the lighting engineer seemed on this occasion to be rather few and far between.

Colour Tolerance

Pride of place must certainly be given to the Colour Group's collective exhibit on the theme of "colour tolerance." This subject is of rapidly growing importance in many industries and in fact a recent symposium, at which nine papers on different aspects of colour tolerance were presented and discussed, is reported elsewhere in this issue of *Light and Lighting*.

The visitor, after he had inspected a series of exhibits illustrating the effect of illuminant colour on the appearance of different foods, and its importance in colour matching paints or vitreous enamel coatings, was invited to try his skill at memorizing the colour of a particular sample of face powder. A little further on he was shown a series of samples of slightly differing tints and could select the one which seemed to him most like the original sample as he remembered it. The backgrounds to the samples were different in the two cases and it is doubtful whether the percentage of correct answers was a high one.

Next came exhibits illustrating the need for a specification of colour tolerances for such things as printing or drawing inks, leather or fabrics of various kinds, while the tolerances actually applied to the colours of signal lights were shown by means of colour filters mounted at their appropriate positions on a colour chart.

The National Physical Laboratory showed the apparatus with which Dr. Crawford is investigating the extent to which the spectrum of an illuminant can be modified without seriously affecting the appearance of objects viewed by it. The light in one or more portions of the spectrum is gradually removed until the appearance of the scene being viewed ceases to be acceptable to the observer; this sets a "tolerance" on permissible changes of the kind made. At the present stage in the investigation, the changes made in the spectrum are "complementary," i.e., they do not alter the appearance of the illuminant or the colour of a white surface. Coloured surfaces, however, are affected to a greater or less extent and it is these changes on which the observer bases his judgment. There is no standard of comparison available to him; he has to depend entirely on his own subjective impression of the colour appearance of the various parts of the scene presented to him.

Several types of colorimeters were shown, including the Donaldson six-colour instrument, the Hilger and Watts tristimulus colorimeter and a colour gauge chiefly used for checking that the colour of a particular product lies within prescribed limits. A gauge of this type is in regular use by a manufacturer of boiled sweets to control variations in the colour of his product—and why not? After all, the original Lovibond Tintometer was designed for the purpose of controlling the colour of a certain popular beverage many years ago.

Light Sources

There were several interesting exhibits of special types of lamps. The GEC Research Laboratories showed some specimens of the new types of tubular fluorescent lamps with high loadings. To increase the loading of the lamp it is necessary to have a larger area of wall surface for the same cross-sectional area and one tube shown had a section in the form of a very thick U, while another was corrugated transversely. The GEC Ltd. showed a number of lamps designed for laboratory use. One was an improved type of sodium lamp; others were lamps containing the 198 isotope of mercury which gives a spectrum with very fine lines, providing the nearest attainable approach to truly monochromatic light.

A number of lamps used as secondary standards in photometric work were also shown by the GEC. These included a 4-volt krypton-filled miners' lamp bulb giving about 50 lumens and operating at a colour temperature of 2,850 deg. K, a standard of luminous intensity with a planar form of filament construction, and two standards of luminous flux, similar in design to general lighting service lamps.

Siemens Edison Swan Ltd. showed a number of flash tubes of different sizes and shapes. By placing the lamps one after the other in an integrating photometer it was possible to show that the total light output for a given loading was very dependent on the operating voltage and on the characteristics of the arc affected by tube dimensions and the pressure of the gas filling.

Another interesting exhibit of flash tubes was shown by the Research Laboratories of the British Thomson-Houston Company. Generally a xenon flash tube is designed to give either single flashes at very high power, with a comparatively long intervening period, or a continuous series of flashes at rates of ten or more per second for the production of stroboscopic effects. The experimental unit shown had an intermediate characteristic, giving flashes at a rate of about one per second with a mean power dissipation of 100 watts. This was designed for research work, particularly on the effects of irradiation on plant growth.

Photo-conductive Cells

Another exhibit on the BTH stand was of photo-conductive cells of the cadmium sulphide type. Before the advent of the two types of photocells with which everyone is now familiar (first the photo-emissive cell and later the photo-voltaic, or so-called "barrier layer" cell) a great deal of work was done on the photo-conductive properties of selenium. Some 80 years ago it was noticed that the electrical resistance of selenium was lowered when light fell on it, so that if a thin strip of this substance between two electrodes (generally zig-zagged for convenience) was mounted on a glass plate, the current which flowed when a voltage was applied between the electrodes increased more

or less in proportion to the illumination of the plate. The new cells depend on the same principle, with crystalline cadmium sulphide substituted for the selenium. Especially interesting were some "single crystal" cells in which the sensitive surface was only one square millimetre in area. These were stated to give, with 100 volts applied across the cell, a current of 400 microamps. for an illumination of 20 lm/ft^2 from a source with a colour temperature of 2,650 deg. K.

It is clear that with a high sensitivity of this order such cells are especially suitable for use in a light-operated switching unit. Such a unit was exhibited by Fleming Radio (Developments) Ltd. It consisted of a photo-conductive cell of the interleaved comb type, connected *via* a two-stage transistor d.c. amplifier to a relay, and could be operated directly from a 12-volt d.c. supply taking a maximum current of 80 milliamps. In the catalogue description it was stated that the unit would operate on an illumination of approximately 0.02 lm/ft^2 and make or break a current of up to 10 amps. The whole unit was very compact, being contained in a 2-inch cube, while the dark current was stated to be negligible.

The use of multiplier photocells for photometric purposes has greatly increased within the last few years, as any study of the literature relating to such apparatus as telephotometers, microdensitometers and the like will show. It was therefore interesting to see the range of cells of this type exhibited by 20th Century Electronics Ltd., although the designers clearly had in mind quite other applications, such as scintillation counting.

Densitometers.

The Baldwin Instrument Company were again showing their various type of densitometers. These included reflection and transmission densitometers, a comparator densitometer and the line densitometer (more suitably designated a microdensitometer) which was described last year. This instrument is now provided with a series of colour filters for use when the density of colour film is being measured.

An instrument specially designed for testing the transmission and scattering power of a transparent plastic was shown by Evans Electroselenium Ltd. under the name of a "Spherical Haze Meter." A parallel beam of light from a stabilised light source and condenser system passed through the specimen to a pivoted sphere with a photocell mounted normal to the path of the light.

Besides their cosine-corrected illumination photometer, Megatron Ltd. showed an instrument which they described as an "integrating light meter" This consisted essentially of a photocell covered with a dome of diffusing material so that the illumination of the cell was more or less proportional to the amount of luminous flux incident on the dome, irrespective of the direction of the light. The instrument was stated to have been developed in co-operation with the National Institute of Agricultural Engineering, presumably to measure daylight in a way analogous to that in which it is accepted by a plant in the open.

A new design of the Lovibond-Schofield Tintometer was shown by The Tintometer Ltd., who also had on view a modified version of the Hand Tintometer shown last year. That model was designed for the measurement of changes in skin pigmentation; the new one is for use by ophthalmologists who wish to study changes in the colour of the pupils of patients suffering from certain eye infections.

Making Colour Prints.

One of the chief difficulties in the rapid production of colour prints is that of deciding on the correct exposure. So far there has been but one alternative to the trial-and-error method, *viz.*, to integrate the colour of the whole negative, on the assumption that for a majority of subjects the result will be similar to that for a neutral grey. This method, however, not infrequently leads to gross errors. Hatfield Instruments Ltd. showed apparatus consisting of a closed circuit colour television system whose characteristics could be adjusted to match those of the desired printing system. The controls provided, each corresponding to a variable in the printing process, were operated so as to obtain the desired result on a visual display and the correct printing conditions could then be found at once without any need for trial prints. The equipment shown was an experimental model.

As in previous years, discourses on matters of general scientific interest were delivered on the first three evenings of the exhibition. That on Monday, by Mr. M. H. Wilson, was entitled "Goethe's Colour Experiments" and covered more or less the same ground as the lecture which Mr. Wilson gave to the Colour Group about a year ago and which was reported in *Light and Lighting* for June, 1957.

Conference on Industrial Lighting

A report on a conference arranged by the IES for works' managers and works' engineers on April 1st.

"*There are only two qualities in the world: efficiency and inefficiency; and only two sorts of people: the efficient and the inefficient.*"

It was with these words of Bernard Shaw that Mr. H. Hewitt opened his talk to some two hundred works' managers and works' engineers assembled at the Northampton College of Advanced Technology on Tuesday, April 1, for a conference arranged by the Illuminating Engineering Society. The President of the Society, Mr. E. B. Sawyer, in welcoming those present, said that the benefits of good lighting were to be seen both in production and in welfare and he asked Mr. Bramley-Harker, H.M. Deputy Chief Inspector of Factories, to open the conference.

Mr. Bramley-Harker said that the Factory Department had a long-standing interest in good lighting and its quarterly publication made frequent reference to the subject. He remarked that the standard of lighting for outdoor areas in factories often lagged far behind that now common in interiors; inside, the lighting was sometimes good and sometimes bad. He then declared the conference open.

During the sessions the chair was taken by Dr. W. E. Harper who said that the conference had been arranged by the IES in order to confront the producers of lighting with the users, so that the latter could put forward their views and ask any questions that might occur to them. After he

Speakers at the IES Conference on Industrial Lighting. [Left to right: Mr. H. Hewitt, Mr. R. Bramley-Harker, Mr. E. B. Sawyer (President), Mr. W. Robinson, Dr. W. E. Harper (chairman of the conference), Mr. J. G. Holmes and Mr. W. R. Stevens.

had explained the procedure to be followed, he introduced Mr. Hewitt who, beginning his remarks with the quotation which appears at the head of this report, went on to say that good lighting had three main functions, *viz.*, to improve efficiency, to contribute to comfort and to promote safety, although these three very desirable results were not entirely unrelated; greater comfort, for instance, made for higher efficiency and more safety.

In approaching the problem of designing the lighting for any particular factory the first thing to examine was the nature of the task. Next came the nature of the workers, i.e. were they trained or untrained, male or female, young or old? It had then to be decided whether the most suitable system of lighting was fairly uniform general lighting over the whole working area, or adequate general lighting, with higher values over machines or comparatively restricted areas of more exacting work. Finally it was necessary to take into account any special problems, such as a corrosive or steamy atmosphere, or a need for special attention to the colour of the light.

Returning to his three headings Mr. Hewitt said that efficiency depended on the provision of sufficient light, correctly arranged, of suitable colour and free from glare. To promote comfort the light should be cheerful and stimulating, while safety called for the lighting of areas where hazards were likely to be encountered and freedom from glare was again very important.

Finally, turning to the IES Code (copies of which were handed to all those attending the conference), Mr. Hewitt explained the way in which it took into account the various elements in a visual task, *viz.* size, lightness, contrast and, where appropriate, the time factor and he concluded by saying that to-day the chief preoccupation of the lighting engineer was with quality rather than quantity.

The Tools of the Trade

This was the description applied by Mr. W. R. Stevens to the lamps and lighting equipment which formed the subject of his talk. Dealing first with the tungsten filament lamp he described in outline its construction, making a particular point of the necessary compromise between high efficiency and long life. Then he showed the two principal forms of gas discharge lamps, the sodium and the mercury, and mentioned their special characteristics. Turning to the fluorescent lamp, he showed an example of the latest development, the lamp with a corrugated tube designed for higher loading, which was to be seen at the Physical Society Exhibition (see page 190). The one kilowatt high pressure mercury fluorescent lamp, so valuable for high bay lighting, was also seen in operation.

A number of special types of fittings were exhibited at the back of the hall, but in his talk Mr. Stevens dealt mainly with the familiar types, the standard dispersive reflector fitting and the more concentrating fittings designed for use with the various lamps he had described earlier. He pointed out the importance of good design which affected not only the efficiency of the fitting as a light-distributing device, but equally the ease with which this efficiency could be maintained.

During the discussion which followed a number of pertinent questions were put by members of the audience. Not unexpectedly, the first related to the collection of dust on plastic fittings due to static. This was dealt with by Dr. Harper who could only give somewhat cold comfort by saying that experiments were in progress on a new Japanese process which seemed to hold out some promise of success. In reply to another questioner Mr. Stevens said that the efficiency of the corrugated tubular lamp was about 5 per cent. less than that of the conventional lamp, while for the 1 kW mercury fluorescent the efficiency was similiar to that of the lower ratings, *viz.* 50 to 55 lm/W.

A question on the tubular fluorescent lamp with internal reflector led Mr. Stevens to make some remarks on the subject of glare. He said that it was generally better to use an ordinary lamp inside an external reflector, but a member of the audience pointed out that if lamps had to be mounted above a daylight, much less daylight was obscured by the reflector lamps than by ordinary lamps in trough fittings.

On the economics of the tungsten lamp ballast Mr. Stevens said that this system was chiefly of advantage where the operating hours of the lamps were low so that the initial cost become relatively more important.

Pounds, Shillings and Pence

The last speaker in the morning session was Mr. W. Robinson who took as his subject "Maintenance and Economics." He began by throwing on the screen a diagram which showed the relative costs of providing a million lumen-hours with lamps of different kinds, taking two different methods of charging for electrical power. He said it was remarkable that, while the utmost care was taken when planning a lighting scheme to ensure the highest efficiency, when it came to operation there was a marked absence of planning of any kind. To take one example, in no factory had he ever found one individual in each room whose responsibility it was to see that the lights were switched on or off at the right times. He suggested the use of a light-operated alarm to indicate when the lights should be put on as well as when they might be switched off.

After showing several depreciation curves, Mr. Robinson dealt with the difficult problem of frequency of cleaning. It was, he said, impossible to lay down hard and fast rules; the matter was one for local decision in the light of all the relevant circumstances. His main plea was that cleaning should be planned and regular, not dealt with in the haphazard way that was so common. Good maintenance could often be made more easy by designing a lighting scheme with this in view.

Turning to lamp replacement, Mr. Robinson pointed out that the cost of replacing a lamp was often very much greater than the price of the lamp and he described two systems of group replacement. One was to replace all the lamps in a given area when a small percentage of them had failed; the other was to replace all the lamps when their

efficiency, on the average, had fallen to 80 per cent. of its initial value. A plan sometimes adopted was to replace lamps well before the end of their useful life in an area where the most important work was carried on and then to use these lamps in other areas where the work was less exacting.

In reply to a question on the advantages of totally enclosed fittings, Mr. Robinson said that these were a good investment and saved money in the long run. With regard to depreciation of the surroundings, particularly the internal decoration (a point raised by another questioner) he said that decoration often looked bad before it had any marked effect on the illumination of the working plane. Nevertheless, it could not be ignored and here again maintenance should be carried out systematically.

A speaker who had evidently given careful consideration to the economics of lighting said that with modern light sources it was possible to provide 20 lm/ft^2 at a cost of about a penny per man-hour in a factory working 24 hours a day. The cost of employing a man for an hour, taking overheads into account, might well be about twenty shillings and it was therefore quite unrealistic to worry about small items of expenditure on lighting.

New Light on Industry

The afternoon session began with a showing of the new EDA film with the above title. (This film may be borrowed without cost from EDA, 2, Savoy Hill, W.C.2.) This was followed by a commentary, given by Mr. J. G. Holmes, on a large number of slides illustrating some recent industrial lighting installations and indicating how particular lighting problems had been solved. First there were slides of an unusually complicated roof structure calling for special lighting treatment. Then there were examples of lighting schemes which, besides providing good illumination, fitted harmoniously into the architectural pattern. After these came views of large buildings in which the lamps had to be mounted at considerable heights; one example was a BOAC hangar with cold cathode tubing 40 feet above the floor. Another interesting example was of high-bay lighting by means of 1-kW high-pressure mercury fluorescent lamps in translucent plastic fittings.

Food processing of various kinds called for enclosed fittings to avoid any risk of contamination by glass from accidentally broken lamps. In specially dusty or fume-laden atmospheres it was often necessary to use dust-proof fittings or fittings which would withstand corrosion. Splashproof fittings were now available, and Mr. Holmes showed an interesting picture of such a fitting being subjected to a test for waterproofness.

Turning to exterior lighting, Mr. Holmes showed photographs of tower floodlights used for lighting large areas such as goods yards. He said that not infrequently a modification of modern street lighting techniques was appropriate for the outside areas of a factory and he showed, as an example, a photograph of the complicated lay-out of pipes and valves outside a modern oil refinery. Finally he referred to the lighting of buildings where an explosive atmosphere might be present. He showed pictures of some flameproof fittings approved for use where such hazards existed, except for Group IV hazards (hydrogen, acetylene, etc.), where only two methods of installation were allowed, *viz.* a completely pressurized system or a system of lighting from outside the building. Several pictures of both types of lighting were shown.

The Brains Trust

After a short break the conference re-assembled for what was described on the programme as a "Forum." All the speakers were on the platform, with the President, Mr. Bramley-Harker and Dr. Harper, and members of the audience were invited to ask questions or to discuss any matters concerned with industrial lighting, whether these had been touched upon earlier in the day or not.

A number of questions had already been handed in and these were dealt with first, Dr. Harper acting as question-master. Curiously enough, the first question was not on artificial lighting at all but on a particular daylight problem, *viz.* the way in which the roof lights should be distributed between the two sides of a saw-tooth roof where both sides sloped at 30 deg. and the ridges ran East and West. The panel seemed generally to agree that there should be more glass on the North side than on the South, but were evidently reluctant to go all out for an entirely North-light arrangement, especially when it transpired that the architect had put half the glass on each side. It was no surprise to learn that this arrangement had caused considerable trouble due to the penetration of direct sunlight.

Next Mr. Stevens was asked to comment on the slow progress of cold-cathode-lighting. He pointed out that the particular merit of this kind of lamp was its very long life. It was, however, relatively expensive to install and in many cases this was the over-riding consideration.

There was then an interesting discussion on the possibility of estimating lighting costs at so much per square foot of floor area. Why, it was asked, could not this basis be used for lighting as it was for many of the other services in a building? After Mr. Robinson had explained why such a method would be difficult and probably lead to gross errors, several members of the audience pointed out that it was, in fact, used quite regularly in certain instances, particularly in educational buildings.

Quite a lengthy discussion was provoked by a question on the dislike which some people felt for fluorescent lighting. Dr. Harper said that it was now recognised that certain individuals were peculiarly sensitive to flicker. These people had a genuine grievance but their complaints were frequently reiterated by others who were not themselves affected. Mr. Bramley-Harker said that much could be done to eliminate unjustified complaints if the management took the trouble to explain to the workers the advantages to be gained by the use of fluorescent lighting.

A question on how to overcome the stroboscopic effect from the HPMV lamp led to an admission by Mr. Stevens that there was no simple way of doing this. His advice was to use tungsten lamps in those comparatively rare cases where the effect was really troublesome. Arising out of this question it was asked why the power factor of cold cathode installations was so low, and a figure of 0.82 was mentioned. This brought Mr. Dykes Brown to his feet with the rejoinder that it was, in fact, never less than 0.85 and in new large installations it was 0.92 or over.

Asked whether "Fibre-glass" was better than "Perspex" for withstanding corrosion, Dr. Harper said that it all depended on the nature of the corrosive substance. For inorganic acids and alkalis there was no difference; for organic substances there might well be a difference in one direction or the other. He then, in reply to the next question, gave some hints on how to clean "Perspex," *viz.* "use a solution of a modern detergent in water and don't polish after drying."

On the subject of flameproof fittings, one questioner asked why the Americans had fittings which could be used in a situation with a Group IV hazard. Mr. Holmes and Mr. Bramley-Harker were united in their opinion that the American regulations were less stringent than those in Great Britain and that the fittings referred to would not pass the

Buxton test. On the use of an approved fitting in an unapproved position, *viz.* upside down, Mr. Holmes said that in the example he had shown, lamps of smaller rating were used inside the fittings.

The final question was a request for guidance on the use of ballasts in situations with a high ambient temperature, e.g. 135 deg. F. Mr. Dykes Brown, having ascertained that the supply voltage was 240, said "use a ballast rated at 250 volts."

Mr. Sawyer then briefly summed up the discussion and concluded the conference by expressing the thanks of the Society to the authorities at the Northampton College, mentioning in particular Dr. Padgham's very active co-operation in making all the necessary arrangements.

Symposium on Colour Tolerance

A report on a symposium arranged by the Colour Group of the Physical Society on April 2nd.

In many industries it is important that the colour of a product should be kept as constant as possible from one batch to another over a long period of time and the limits within which the colour may be allowed to vary, i.e. the permissible colour tolerances, are of the greatest interest. It was therefore not unexpected that the all-day symposium on the subject, held by the Physical Society Colour Group on April 2, should have attracted a large number of members to hear and discuss the nine papers presented by as many different authors with almost as many different points of view.

The first paper was read by Mr. J. W. Perry, of Hilger and Watts, Ltd., the Chairman of the Group. In it he discussed the various methods available for formulating a colour tolerance specification; it could be based on observational data, or on some more or less empirical formula derived from colour theory and experience, or on a combination of the two. He pointed out that, while the problems of the assessment of colour tolerances were immediate and pressing, the fundamental work needed in order to provide the answers was very complex and would require years for its completion. He suggested that, because the conditions of observation had such a marked effect on the results obtained, a very useful step forward could be taken by standardising these conditions, particularly as regards the state of adaptation of the observer.

The next paper, by Mr. N. F. Hughes and Mr. A. D. Lott, both of the Metal Box Company, Ltd., was summarised by the latter author. It dealt with colour tolerance in printing inks and the authors described the methods they used to arrive at practical limits. Films of specified thicknesses were laid down by hand rolling on standard backgrounds consisting of white and black coated tinplate. In this way troubles due to variations in paper backgrounds were avoided. The samples were measured with a tristimulus colorimeter, using standard illuminant C, and the results were plotted on x, y and x, r charts. When samples from at least 10 batches of a shade had been measured they were examined by a small panel of observers who thus laid down limits of acceptability on these charts.

The third paper, by Mr. J. S. Mudd, dealt with colour tolerance in the leather industry. He had found that as far as that industry was concerned, luminance differences were weighted more than differences of chromaticity by the average observer. He described a detailed comparison carried out between the results of observer assessment and those obtained with a colorimeter; it was found that on the whole the agreement was satisfactory. A very important matter was the change of colour produced by fading and Mr. Mudd said that for tests of this property the xenon arc gave results similar to those obtained with daylight, while possessing the additional advantage of constancy.

The three papers were discussed together and a number of questions were put to the respective authors, especially Mr. Lott. It was pointed out that in the manufacture of printing inks the control had to be applied during the course of manufacture and it had therefore to be done in a few minutes. With regard to the relative importance of luminance differences and differences in chromaticity it was felt that this might well differ in different industries, and in fact Mr. Mudd agreed that in the lighter shades chromaticity differences tended to become more important.

Mr. F. L. Warburton then spoke briefly on colour tolerances in textiles. He made the point that in a very large number of cases what the customer asked for was that a material should harmonise with existing colours, not that it should match them. A notable exception occurred when materials were to be used for uniforms, especially those intended for wear on ceremonial occasions. It was important, too, that there should be uniformity within a batch of material and Mr. Warburton showed a pair of blue trousers in which, owing to variation across the width of the piece, there was a noticeable mismatch at one of the seams.

An important matter was the testing of materials for fastness to light and this was complicated by the lack of any really adequate substitute for natural daylight as a fading source. In carrying out such tests it was necessary to keep a rigid control on the conditions, especially humidity.

The last paper of the morning session was read by Mr. P. S. Williams of ICI (Paints Division) who examined the problem of satisfying a customer that a paint "" matched " a particular pattern, often that displayed by the manufacturer on a "colour card." One difficulty was the variation introduced by differences in the viewing conditions, as mentioned earlier by Mr. Perry. Another was that there could be, and often were, wide differences in the tristimulus values measured on different colorimeters. The few existing specifications for the colours of paints, said Mr. Williams, did little more than indicate general regions of colour.

After lunch, Mr. J. M. Adams of PATRA (the Printing, Packaging and Allied Trades Research Association), spoke about colour tolerance in the paper industry. During the course of a brief outline of the process of paper making he explained that the colour was controlled at two stages, *viz.* during bleaching and in the beater. Once the pulp had left the beater no modification of colour was possible and much therefore depended on the skill of the craftsman who might be required to maintain the luminance factor within one per cent. and the trichromatic coefficients to within less than 0.002. In practice these tolerances were maintained visually, often assisted by abridged spectrophotometry. Mr. Adams touched on the complication introduced by the use of fluorescent dyes in paper.

Mr. D. L. Medd, of the Ministry of Education, spoke on colour from the point of view of the architect. He explained, with a number of pairs of colour slides, how colour appearance was affected by the conditions of observation such as distance, degree of shadowing, relative area and the like. The fact that the architect was having to rely

more and more on the use of factory-made products meant that colour tolerances were becoming increasingly important to him and a system of specification based, like that in BS 2660, on the Munsell atlas provided valuable common ground on which the architect and the colorimetrist could meet.

After a discussion of the last two papers, Dr. J. W. Strange gave an interesting summary of his paper on colour tolerance in lighting. He pleaded for more agreement on the method of expressing colour differences as related to colour tolerance and referred to BS 1843 for fluorescent lamps in which tolerances were expressed in terms of minimum perceptible colour difference, defined as equivalent to the standard deviation in making a colour match.

Turning to colour rendering tolerances he said one basic difficulty was that the acceptability of colour rendering was almost entirely a subjective matter. He advocated the use of five spectral bands, instead of the eight provisionally adopted by the CIE, for describing the colour rendering properties of an illuminant. Both alternatives were included in BS 1853.

The final paper, on colour tolerance in colour reproduction systems, was by Dr. R. W. G. Hunt of the Kodak Research Laboratories who demonstrated, by means of a number of colour slides, the effects of adaptation and of the surrounds on the acceptability of the colours in a reproduction. He made the point that, although in fact these colours tended to be desaturated, the complaint was often made that the colours in a picture were too vivid as compared with those in the original scene.

The symposium closed with a general discussion in which a number of speakers joined. It is understood that the papers presented will be published in full (and in English) in *Die Farbe*. Enquiries may be addressed to the Hon. Secretary of the Colour Group at the Institute of Ophthalmology, Judd Street, W.C.1.

Trade Literature

A.E.I. Lamp and Lighting Co. Ltd., Lamp Dept., 44, Fitzroy Road, N.W.1.—Shoplighting Handbook giving illustrated details of window lighting techniques, rules of display lighting, shop interior lighting, lighting equipment and lighting data.

Holophane Ltd., Elverton Street, Vincent Square, London, S.W.1.—Two new brochures, SL.258 for post-top refractors describing prismatic units for pedestal mounting in Group "B" application for use with tungsten filament, sodium, mercury discharge and mercury fluorescent lamps. Also SL.358 illustrating the "Acorn" Bowl prismatic refractor for use with 750/1,000-watt tungsten filament lamps and 400-watt MBF lamps.

Victor Products (Wallsend) Ltd., G.P.O. Box No. 10, Wallsend-on-Tyne.—Catalogue L.600 giving full details and prices of this firm's complete range of "Victor" industrial lighting fittings including flameproof, weatherproof-flameproof and weatherproof-dustproof fittings.

J. A. Wilson Lighting and Display Ltd., 280 Lakeshore Road, Toronto, 14, Canada.—Leaflet F500 giving illustrated information on the new Wilson "Paralux" low depth ceiling mounted fluorescent fitting.

Situations Vacant

Troughton & Young (Lighting) Ltd., 143, Knightsbridge, S.W.1, have a vacancy for a Representative for liaison with architects, consultants and large users in the London area. Technical knowledge not necessary. Salary according to ability. Apply in writing stating age and experience to Technical Director.

Design and Sales Engineer required by West Riding firm to develop designs and sale of Industrial & Commercial Electric Lighting and Heating products. Age about 27 to 40. Write giving full particulars and salary required to Box 584.

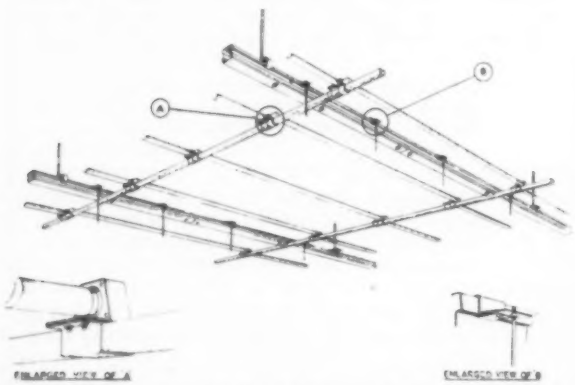
NEW PRODUCTS

Luminous ceiling

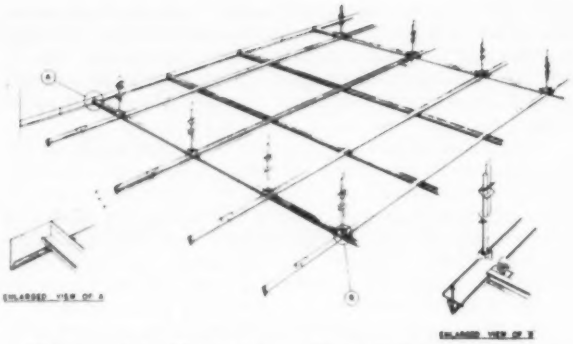
A new and ingenious ceiling lighting system based on the system developed by Sylvania in the USA is announced by Atlas Lighting Ltd. "Sylvalume" combines the functions of a decorative ceiling and an efficient lighting installation and enables both to be used as part of the architectural design. It provides "wall-to-wall" lighting and offers complete freedom to the designer or architect to exploit the possibilities of pattern, texture and colour.

The standard components are simple and few, and the ceiling can be installed easily and quickly in old or new buildings at a cost comparable with any normal suspended ceiling and its lighting fittings. The lighting control gear and tubes operate from lighting trunking supported at convenient points from the building structure. This trunking carries the control gear and cables for the appropriate number of 8-ft. 125-watt fluorescent tubes. Cross-beams between the trunking sections hold the fluorescent tubes, which can be fixed at any point along the beams, the number of tubes depending on the illumination required. From the trunking an extruded aluminium grid, based on the 3-ft. module, is suspended. Within it, three-feet square vinyl sheet diffusers of different textures, colours and forms are clipped into the grid by a spring attachment and arranged in any desired variation.

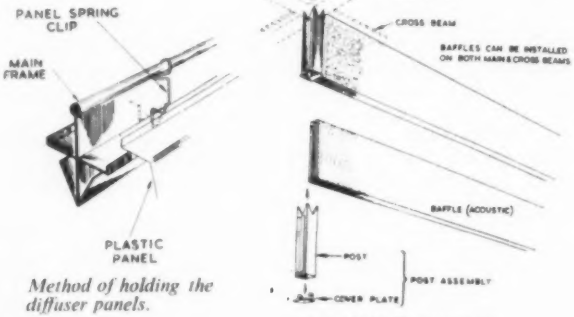
Atlas 'Sylvalume' ceiling showing alternative diffuser panels. Acoustic baffles have been added in this installation.



The trunking system. 'A' shows the mounting of lamp-holders on the wiring channel; 'B' shows the method of attaching the suspended ceiling to the trunking.

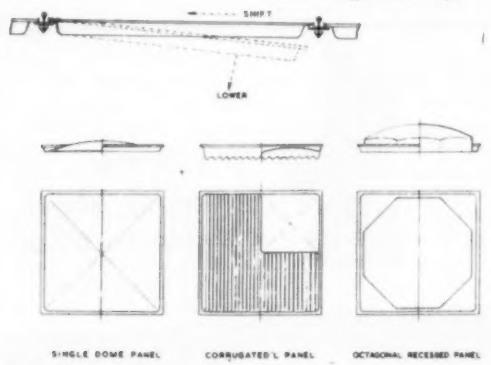


The suspended ceiling. 'A' shows the engagement of perimeter beams with wall rails; 'B' shows the variable suspension assembly.



Method of holding the diffuser panels.

Acoustic baffle assembly.



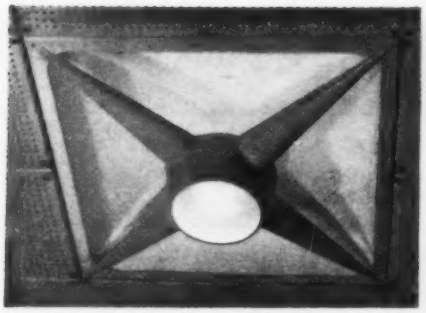
Types of diffuser panel.

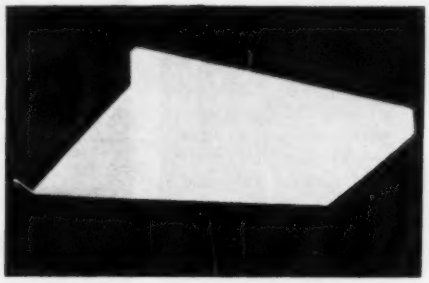
Three-foot acoustic baffles can be fixed to the grid in any desired geometric pattern. These baffles are of yellow, black or white perforated metal with fibreglass filling and can be used to give visual interest to the ceiling as well as improving its acoustic properties.

The complete "Sylvalume" system can be considered as two separate sections: (a) The actual luminous ceiling suspended below the true ceiling, and (b) The fluorescent lighting equipment used to illuminate the diffusing panels.

The fluorescent lamps are supported by a network of trunking of two different types—the main trunking accommodating the fluorescent control gear and installation wiring and a smaller "Uni-strut" channel accommodating the lampholder leads and lampholders.

The main trunking may be suspended by rods fixed





Two new Courtney, Pope (Electrical) Ltd. fittings. Left, the 'Sputnik,' a dome fitting housing a 200-watt tungsten lamp for recessing in a 2 ft. module suspended ceiling; right, a ceiling mounted fluorescent fitting giving the appearance of a recessed unit.

Above, Siemens Ediswan 'School Fitting.'

directly on to the true ceiling. Normally it would be suspended at 9ft. intervals with the standard "Uni-strut" lampholder channel connected at right angles to it. The open side of the lampholder channel is mounted uppermost against the open base of the trunking. Control gear trays containing "Quickstart" gear for either one or two 8ft. 125-watt tubes are clamped to the open base of the main trunking by quick-release toggle clips and support chains are attached so that they can be suspended for maintenance or inspection. The lampholder leads are enclosed within the trunking and channels and terminate in "Atlantic" range spring-loaded bi-pin lampholders which are attached to the wiring channel by a special bracket.

Although this special trunking system has been designed exclusively for use with "Sylvalume" it is possible to use other types of standard fluorescent lighting equipment for the illumination of the diffusing panels. For example, it will be possible to use standard batten fittings mounted direct on the true ceiling in the case of small installations.

School lighting fitting

Though suitable for use in a wide variety of buildings, the particular term "School Fitting" has been given to a new Siemens Ediswan interior diffuser bowl. The fitting is available in 200-watt or 150-watt versions for ceiling or pendant installation. With overall diameter of 12in., these bowls prevent direct view of the lamp at normal angles, whilst allowing easy lamp replacement from below. The acid-etched three-ply opal glass bowl is held by three knurled head screws to the gallery, which is in aluminium. The fitting meets the requirements of the Ministry of Education Statutory Instrument No. 473 and the requirements of BS Codes of Practice. Prices are: £2 4s. 0d. plus P.T. for the ceiling type and £3 plus P.T. for the pendant version.

Safety feature for tungsten lamps

A new safety feature incorporated in Crompton high wattage lamps is now available to special order. This device is designed to prevent the possibility of a lamp shattering at the end of life, which may result from the thermal shock of molten metal falling from the filament or supporting wires. The safety feature consists of a circular platform of transparent material inserted into the bulb during manufacture. (The platform does not reduce the lighting efficiency and is proof against penetration by hot metal.) With the lamp used in its normal position, i.e. cap upwards, the platform, being free to move, assumes a horizontal position at the base of the bulb and prevents any molten metal from reaching the glassware. If the lamps are required for angular operation, the platform is easily persuaded to assume a position beneath the filament system and thus affords the same protection.

INSTALLATIONS

High tower lighting of a football ground

Europe's highest floodlighting installation towers were first used publicly at Newcastle United's Football Ground at the end of March in the inter-league match between Scotland and England. The pylons—197ft. tall—were designed by the general contractors, Miller & Stable Ltd., of Edinburgh, and the floodlighting equipment supplied by Atlas Lighting Ltd. Each of the four towers, two at either end of the ground, contain forty-five 2,000-watt angle-burning and projector lamps. This is the first installation of its kind in the country to use such a powerful battery of 2,000-watt lamps.

High tower lighting at a colliery

Railway marshalling yard lighting using standard long range tungsten floodlight projectors on high towers has recently been installed at Blidworth Colliery, in No. 3 Area of the National Coal Board East Midlands Division.

The rail layout at Blidworth, as in most collieries, is particularly suited to this type of installation consisting essentially of three straight railway grids, sited end to end. Empty trucks are assembled on the first grid which converges to a single track at a weighbridge. The trucks pass through this neck to the central grid where overhead conveyors load them, and then pass via a second weighbridge to the third

One of the 197 ft. towers at the Newcastle United's Football Ground.

grid to await transportation. Each of these grids is 200ft. wide and from 300 to 400 yards long.

150ft. and 100ft. towers carrying M.25 projectors housing "Mazda" 1,500-watt GLS lamps are situated at each of the siding necks, and floodlights from opposite faces light the three sections, the lighting of the centre section, where loading takes place being shared by both towers, thus ensuring maximum utilisation of the towers. The towers are ideally situated, one on the centre line of each of the outside grids, as in this position the minimum amount of shadows is cast between the trucks, and they are under close observation by the weigh office staff.

The flexibility resulting from the ability to add to, or re-direct the floodlights as required, is said to be an advantage of the system and it has been found practicable to dispense with much of the surface lighting in other parts of the colliery by the use of a few additional floodlights suitably trained.

Long range floodlight at Blidworth Colliery.

The scheme was designed by AEI Lamp and Lighting Company Ltd. Towers were supplied by Tubewrights Ltd. The contractors, who designed foundations, erected towers and carried out electrical installations, were Clough Smith & Co. Ltd., Wolverhampton.

Self-service shops

The importance of lighting in self-service is emphasised by the use of Lumenated Ceiling installations in the latest self-service shops of J. Sainsbury & Co. Ltd. at Hemel Hempstead, Harlow New Town, Paddington and Crawley.

Twenty of the familiar Sainsbury's shops—there are some 260 of them in the Home Counties, lower Midlands, East Anglia and South Coast areas—are now self-service.

The outsides of the new Sainsbury shops have necessarily changed greatly from the familiar heavy fascias with gilt or gold-leaf lettering on blacks, reds and browns. All is now glass, broken only by doors, and the fascias either of mosaic or of granite are now designed with lettering in colours to suit the locale and adjacent shops. Some, for instance, have sculptured lettering in red, others mosaics.

Interiors have been specially designed to give wide gangways and easy access to any of the parallel island and wall display units. The older style Sainsbury's shops have two long wall service counters. The only true counter service in the new shops is on the butchery counter. The other "counters" consist of refrigerated display cabinets for perishables and "gondolas" for dry goods. Most fixtures are stove enamelled in a mushroom shade contrasting with the cream walls.

'Lumenated ceiling' in Sainsbury's self-service shop at Paddington.

Sainsbury's made a two-fold discovery early in their change over, during which they were anxious to consolidate their established reputation for quality. Firstly, lighting must be bright to attract the customer in and to obviate window and other glass reflections; secondly, and perhaps more importantly, food must not only be good—it must look good.

In four of the newest shops, those at Hemel Hempstead, Harlow New Town, Crawley and Paddington, the lighting problem has been solved by an overall Lumenated Ceiling. The three new town shops each have a normal flush ceiling installation, the Lumenated Ceiling lying some two feet below the true ceiling and incorporating ventilating trunks and tungsten spotlamps where required in the edge infilling.

The Portchester Road, Paddington, shop has a "switchback" Lumenated Ceiling. These premises at Paddington had formerly been an old-fashioned draper's shop with a 16-ft. ceiling. To give Sainsbury's manager floor control with a clear view to all counters and to put the office in its logical position over the check-out cash desks, his office was put up on stilts. The Lumenated Ceiling was then tilted to rise up from the normal ceiling height of 12ft. to the 13ft. 10in. top of his office so that he could see all the shop floor. To match this functional sloping ceiling, the other Lumenated Ceiling areas beyond the dip were also zig-zagged. The result was a most pleasing undulating design.

The right colour values for customers and food were achieved in these shops by the use of de-luxe warm white fluorescent tubes. The Harlow, Crawley and Paddington shops all use 8-ft. 125-watt tubes; at Hemel Hempstead 5-ft. 80-watt tubes are used.

The design of each shop was the result of close co-operation between the architects' and engineers' departments of Sainsbury's in consultation with outside experts such as those of the lighting firms and Lumenated Ceilings Ltd. who supplied the special ceiling lighting installation.

Synagogue in Great Portland Street

A picture of the interior of the new Central Synagogue in Great Portland Street, London, W.1, is shown on page 173. Lighting is by means of three large chandeliers, nine smaller ones and seventeen three-lamp wall brackets. There are also a number of dish-type fixtures in plaster domes under the galleries. The lighting fittings were made by George Forrest & Son; the architects were Edmund Wilford & Son, and the electrical contractors Freeman Electrical Co. (London) Ltd.

I.E.S. ACTIVITIES

London

At the sessional meeting held in London on April 15 a paper entitled "Characteristics and Applications of Photo-electric Cells" was given by Dr. F. A. Benson of Sheffield University.

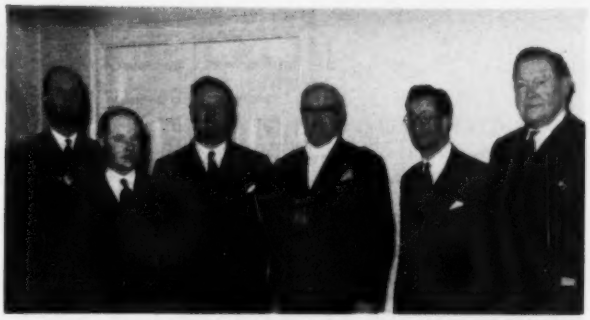
Dr. Benson dealt first with the theory of photo-emission and the properties of photo-emissive cells. In such a cell electrons are liberated from a suitably prepared surface by the radiation. Einstein postulated that light energy is absorbed in a quantised way, the energy of a photon being changed to kinetic energy of an electron inside the metal. The electron can acquire sufficient energy to overcome the potential barrier at the metal surface and so escape. Einstein's photo-electric equation shows that for every photo-cathode there is a certain threshold wavelength of the exciting light beyond which emission is not possible. The various types of cathode which have been developed are described.

Photocell sensitivity can be increased by introducing gas into the bulb so that ionisation takes place. Gas-filled cells have low amplification factors and poor frequency responses, however, and these limitations have led to the development of photo-electric multipliers where the original photo-current is amplified by using the phenomenon of secondary emission.

Cells do not show uniform sensitivity over the whole spectrum, but the response curves usually exhibit one or more maxima. The heights and positions of these maxima depend on the surface. When a photocell is in the dark, current still flows and this must be kept small if very weak signals are to be detected. The paper also mentions fatigue effects in cells, and discusses noise, frequency response and associated circuits.

Dr. Benson then described the mechanisms and characteristics of various types of photo-voltaic and photo-conductive cells and gave some details of semi-conductor photo-cells. In a photo-conductive cell, incident radiation causes a change in electrical conductivity of a material. The efficient photo-conductive materials known include selenium and the sulphides, selenides and tellurides of several elements. The responses of photo-conductive cells are mainly in the infra-red and the red parts of the spectrum. In a photo-voltaic cell incident radiation causes an e.m.f. to be set up at the cell terminals. Development of modern photo-voltaic cells began with Grondahl's work on copper-oxide rectifiers in 1926-7, but selenium is now commonly used because of its good sensitivity. The threshold wavelength of a selenium cell is greater than 7,500Å and the cell has reasonable sensitivity even at 3,000Å. Many of the characteristics and applications of transistors are well known. The ordinary transistor is protected from light by an external coating because the current flowing in a semi-conductor like germanium is a function of the quantity of light falling on it. The photo-transistor takes advantage of this phenomenon. Such a device possesses high sensitivity, low noise, micro-second response and has a physical volume equal to about that of a 0.22 calibre bullet.

The remainder of the paper dealt with cell applications. The number of possible applications in industrial practice is enormous and covers a very wide field. There are few areas of human activity in which photo-electricity does not play some part. Cells may operate almost any kind of electrical or mechanical device through suitable amplifiers and relays. They may cause a device to react to almost any light-intensity variation and will respond to radiation in the visible, infra-red or ultra-violet parts of the spectrum. The applications of cells to photometry, spectrophotometry, astronomy, radiation detection, recording of transient optical phenomena and in reflectometers, fluorometers, refractometers, colorimeters and turbidimeters were briefly discussed.



At the Liverpool Centre lunch on March 3; (left to right), the President, Mr. N. Blackman, Mr. W. B. Parkinson (chairman), the Lord Mayor of Liverpool, Mr. G. F. Cole and Sir Charles Martin (Chief Constable).

At the dinner of the Stoke-on-Trent Group; (left to right) front row, Mr. H. Short, Sir John Wedgwood, Mr. D. C. Harris (chairman) Mr. G. E. Kemp; back row, Mr. R. C. Willdey, Mr. R. F. Squire, Lt.-Col. G. A. Gould, Mr. W. E. Darby, Mr. J. A. Bate, Mr. J. P. Oliver.

Leicester Centre

Mr. K. R. Ackerman of the British Broadcasting Corporation was the speaker at the meeting of the Leicester Centre on March 24 when he gave a lecture on "Television Studio Lighting Equipment."

Mr. Ackerman suggested that perhaps television was the most difficult media for lighting as speed was the all important factor. Lack of time for preparing the sets and the pressure of time during a performance were the main difficulties. This was further complicated by the mass of equipment and cameras on the floor area as well as booms which suspend the microphones in mid-air. The lighting supervisor had to be an artist as well as an engineer and his job was to create the illusion of three dimensions by his mixing and control of light. Mechanical handling of the heavy lighting equipment was essential and in modern studios electric lifts were used to move the overhead lighting into the desired positions. At Riverside No. 1 Studio over 160 dimmer banks were in use and controlled in such a manner as to pre-select the lighting for the following scene. The value of light intensity for a studio was in the region of 60 to 80 lm/ft^2 with a considerable number of spots and floods for emphasis lighting. In the main, tungsten filament lamps were used, the largest lamp being of 6 kw. The new Television Centre now in course of construction will have seven large studios and provision has been made to extend this at a later date; when complete it will be one of the finest television centres in the world.

POSTSCRIPT By 'Lumeritas'

AMONG the natural wonders of the world one of the most impressive is Niagara Falls, and the spectacle of these falls floodlighted in colour is an unforgettable one. I had the pleasure of seeing this spectacle a few years ago from the vantage point afforded by the deliberately dimly-lighted dining room of the General Brock Hotel. Soon the existing installation of floodlights is to be replaced by a new one utilising projectors of British design and manufacture. Twenty GEC high-current density carbon-arc projectors incorporating remotely-controlled automatic colour-changing devices are to be used, and these will illuminate a panorama which includes the Canadian Horseshoe Falls, the Upper Rapids, the American Falls and Goat Island, which intervenes between the two great falls. Besides illuminating a larger area than is covered by the existing 24 floodlights, the new projectors will raise the brightness by a factor of seven without consuming any more power. It is 33 years since the existing system of floodlights was installed and nearly 80 years since the Falls were first illuminated by electric light. The British GEC and the associated Canadian AEC are to be congratulated upon securing the contract for this new equipment in the face of keen competition.

WHAT struck me as a very praiseworthy attempt to increase the membership of the Illuminating Engineering Society came to my notice in the January issue of the *Osram Bulletin*. This issue contained a loose insert explaining the objects and activities of the Society and pointing out the advantages of membership. It was written by S. Anderson in an admirably concise and readable way, and it certainly deserves to bear fruit. Next year the Society will celebrate its fiftieth anniversary, and a substantial increase in membership would doubtlessly be most welcome. I believe the membership of the corresponding American society exceeds 9,000. The United States have, of course, a much larger population than we have, nevertheless, the present membership of our own Society—about 2,400—is not as great as it should be.

THE "design of the visual field" is an expression that has been used for some time within a small circle of "lighting people" concerned with the improvement of methods of designing lighting. It is used particularly with reference to the luminances of the various surfaces which are included in most fields of view, and especially in fields of view provided by building interiors. But this particular meaning is only one of those which such a general expression implies. Others, of course, are the design of the forms and shapes of the objects comprised by a field of view, and the design of the colours of the objects and surfaces of which such a field is composed. In fact, "the design of the visual field" is something which does not lie exclusively in the province of the lighting designer although, to be sure, no visual field will be apparent in the absence of light! The Alexandrian Greeks recognised—as a branch of the science of optics—what they termed Scenography. This was certainly concerned with the design of the visual field, as it still is—though not under this admirably descriptive name. This is where the architects and the interior decorators come in. But in ophthalmic optics "the visual field" has quite another meaning and to speak of designing it has no meaning! Here, what is understood by the visual field is the angular extent of the field of sight centred about the visual axis of the eye. The measurement of this field is often a very important procedure in the practice of ophthalmology since it may disclose anomalies, such as contraction of the field, or blind areas (scotomata), which are diagnostically significant. The measurement of the more central zones of this field is called campimetry, and a new technique is described in the latest issue of the *British Journal of Ophthalmology* which has been developed by J. V. Smith along lines suggested by H. C. Weston. The method involves a reversal of the conventional clinical procedure and the use of a flashing light as the test stimulus.

THE atomic lamp developed at Harwell has already raised hopes in the breasts of some urban council members that substantial savings in the cost of street lighting may soon be effected. As reported in the national daily Press, the atomic lamp has a phosphor lining and is filled with radioactive Krypton 85 by means of which the phosphor is excited. At present the light output is low, but the expectation is that it can be quite considerably increased. Lamps of this kind are said to be quite safe to handle, and since they are expected to have a useful life of about 10 years they would, obviously, be particularly useful for some applications where absolute reliability is highly important and the regular inspection and maintenance of ordinary lamps would be either difficult or unusually costly. Such lamps would need no power supply and no switching and they would be alight continuously, day and night. However, they could not be used for pedestrian crossing beacons—where the legal status of the crossing is conditional upon day and night beacon lighting—because they could not be made to flash. As for street lighting, some inspection would still be necessary so long as street lamps are subject to failure due to vandalism.

IN reading a full page of text in *Light and Lighting* the minimum total distance swept by the gaze is about 24 yards. This distance is punctuated by numerous stops and starts, for the eyes have to pause to take in information "chunk by chunk." No one has ever estimated (as far as I know) what total distance the gaze traverses in the course of an average day but it must be very considerable. What stout-hearted "fellows" are those little muscles that swing the eyes to and fro, and up and down, to con "the world in which we live and move and have our being" all day long! They are built for the job but, make them cause the eyes to move too much—because the lighting is insufficiently revealing—or make them hold the eyes too still too long, and "tired eyes" is the result.

Here is louvering with a difference. The advantages of Luve-tile panels are already well known, painting some areas black has lifted an ordinary scheme into the realm of design.
Harris and Sheldon Electrical delight in just such special jobs. The picture on the right shows their imaginative approach to a very popular type of glassware—this fitting, designed by Robert Tate, is only one of the wide Handslite range.

Luve·tile

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'Perspex' lighting fittings made by Ionlite Ltd. and Suntex Safety Glass Industries Co. Ltd., for National Provincial Bank, Southsea.

This modern bank uses 'Perspex' lighting fittings

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Because it is so attractive and because it is easy to shape, 'Perspex' is a material which offers great scope to the inventive designer. The lighting fittings in this branch of the National Provincial Bank demonstrate that point. Good lighting is essential wherever close figure work is done and in this Bank 'Perspex' has helped to achieve this result efficiently and elegantly.

·PERSPEX·

'Perspex' is the registered trade mark for the acrylic sheet made by I.C.I.

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INDEX TO ADVERTISERS

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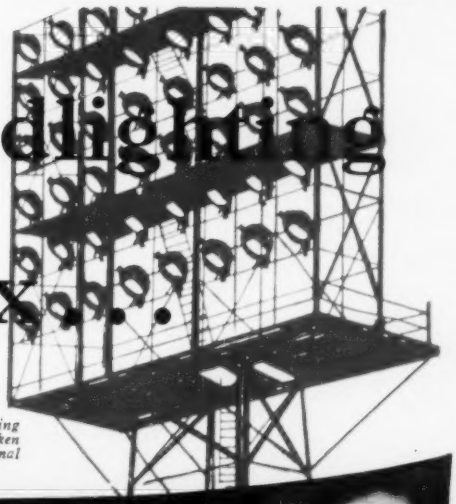
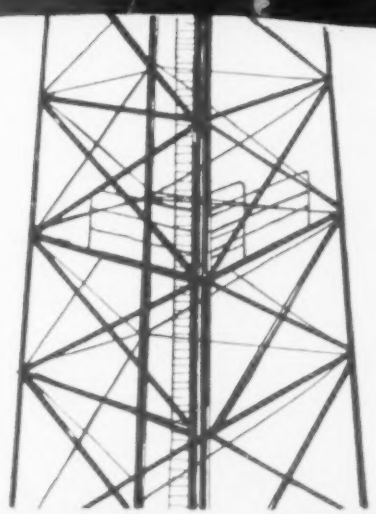
New REVO floodlighting at Molineux...



This action photograph showing Wolves playing Real Madrid under the new floodlighting was taken at 1/50 sec. at an aperture of f.11—i.e., a normal daylight exposure.



After exacting tests with floodlights of varied makes, Revo equipment was chosen to provide Wolverhampton with the finest football-ground floodlighting system in the country.

The four 146 ft. towers each support 48 Revo floodlights fitted with silvered-mirror reflectors and using Tungsten Filament Lamps, giving a total floodlighting load of 330 Kw. Facilities have been provided to increase the number of floodlights per tower to 60, giving a total load of 415 Kw.

Revo equipment has been specified for some of the most important installations of public and industrial lighting throughout the world, and the Wolverhampton Wanderers Football Club scheme is yet another example testifying to the high quality and efficiency of Revo products.

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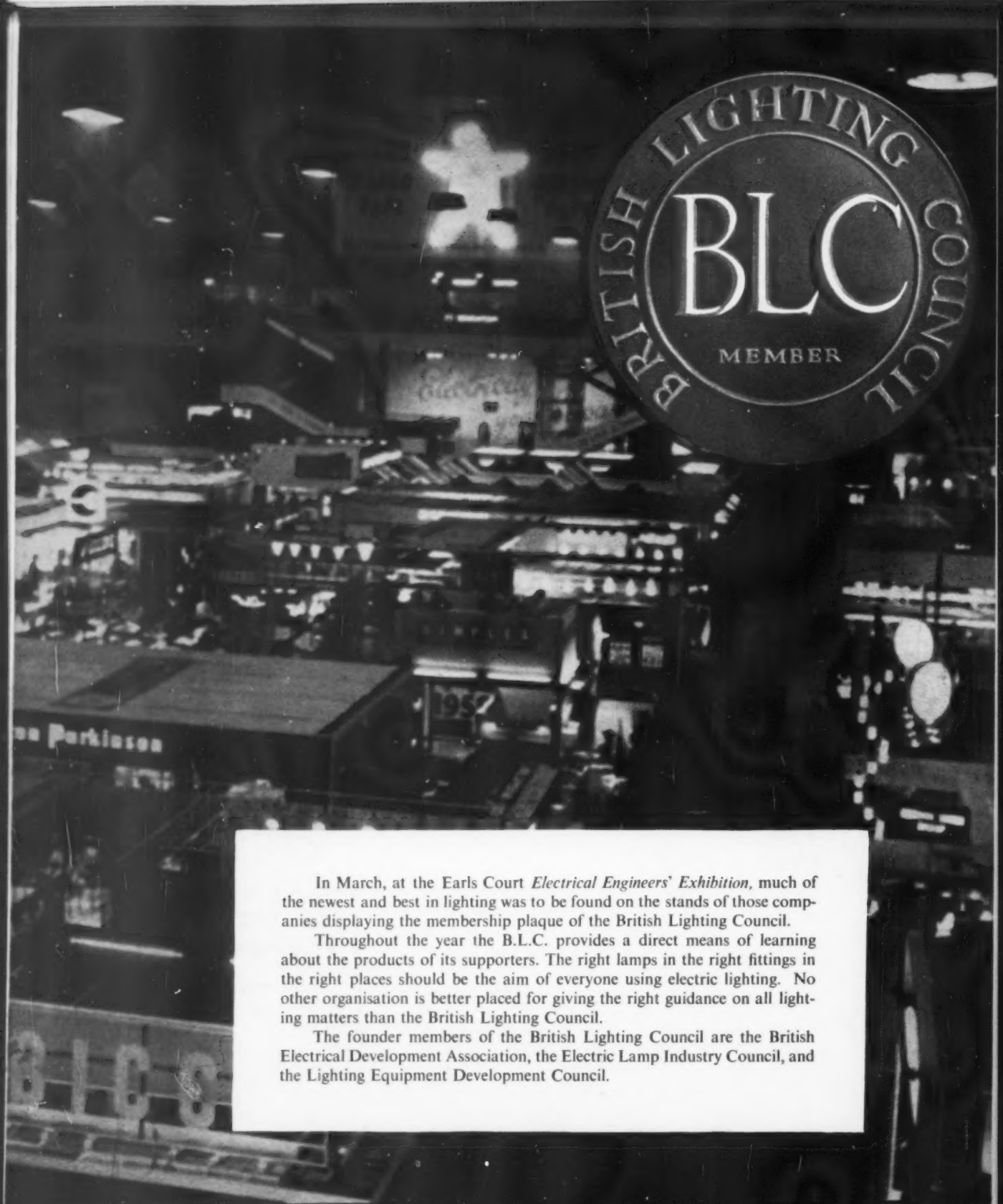

In March, at the Earls Court *Electrical Engineers' Exhibition,* much of the newest and best in lighting was to be found on the stands of those companies displaying the membership plaque of the British Lighting Council.

Throughout the year the B.L.C. provides a direct means of learning about the products of its supporters. The right lamps in the right fittings in the right places should be the aim of everyone using electric lighting. No other organisation is better placed for giving the right guidance on all lighting matters than the British Lighting Council.

The founder members of the British Lighting Council are the British Electrical Development Association, the Electric Lamp Industry Council, and the Lighting Equipment Development Council.

THE BRITISH LIGHTING COUNCIL ★ 2 Savoy Hill, London, WC 2